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ABSTRACT

This report describes National Science Foundation (NSF) activities in support of two-year college science, mathematics, engineering, and technology education for fiscal year 1996. Chapter 1 includes an introduction and overview, with tables showing the levels of two-year college support by NSF division from 1993 to 1996. Chapter 2 provides information on leadership and outreach activities undertaken by the Education and Human Resources (EHR) division, including workshops related to engineering technology education, a summer internship program, ethics and biotechnology, a community college day, and related conferences and publications. The third chapter outlines the Advanced Technological Education Program and offers tables of data. Chapter 4 describes leveraged program support by divisions of EHR, including the Division of Undergraduate Education; Division of Elementary, Secondary, and Informal Education; Division of Human Resource Development; Division of Research, Evaluation, and Communication; and the Division of Educational System Reform. The last chapter reviews research directorates, including NSFNET and Network Infrastructure Program, Technology Reinvestment Program, and Engineering Education Coalitions. Appendices include FY 1996 awards, an index of principal investigators, and publications of prior year activities involving two-year colleges. (YKH)

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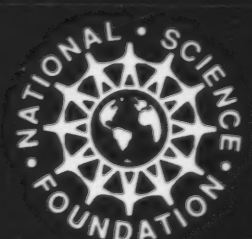
ED 417 780

NATIONAL SCIENCE FOUNDATION ACTIVITIES IN SUPPORT OF TWO-YEAR COLLEGE SCIENCE, MATHEMATICS, ENGINEERING, AND TECHNOLOGY EDUCATION

A REPORT OF THE DIVISION OF UNDERGRADUATE EDUCATION

FISCAL YEAR 1996
ANNUAL REPORT



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Foreword

The Division of Undergraduate Education (DUE) is the focal point for NSF's mission in undergraduate education and as such the focal point for community colleges. Work on this report was led by Elizabeth Teles, Lead Program Director for the Advanced Technological Education (ATE) program, and Jack Hehn, Program Consultant for ATE. Valuable input was provided by Duncan McBride, DUE Section Head for Laboratory and Technology; Peggie Weeks and Myles Boylan, DUE Program Directors; Sandra Nelson, Science Education Analyst; Tim Kashmer, Program Assistant for ATE; and Norma Jeanne, Technical Assistant.

Two-year colleges and NSF can take pride in the quality of science, mathematics, engineering, and technology (SMET) projects and scholarship described in this report. NSF is enlarging its contribution to strengthening SMET education in the nation's two-year colleges. We believe this important national function is well served by NSF. As shown by the tables in this report, over the FY 1993 - FY 1996 period, NSF direct support for two-year colleges has risen from about $7 million per year to the current level of more than $44 million. Although $23 million of this increase can be attributed to the Advanced Technological Education (ATE) program which is directed primarily at improving technical education in two-year colleges, support through other programs in the Directorate for Education and Human Resources (EHR) and NSF research directorates also continues to rise.

Two-year colleges are engaged with other academic and industrial partners in many collaborative activities. An emerging national leadership among two-year college SMET faculty members has played an active and effective role in this progress. Also the activities of two-year college SMET faculty in numerous professional associations have been critical to this advancement.

This report will help inform the two-year college community and its many supporters and expand the dialogue between NSF and two-year college faculty and staff who participate in NSF programs and sponsored events like those exemplified.

NATIONAL SCIENCE FOUNDATION
ACTIVITIES IN SUPPORT OF TWO-YEAR COLLEGE
SCIENCE, MATHEMATICS, ENGINEERING, AND TECHNOLOGY EDUCATION

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NOTES ON SOURCES OF DATA

The data provided in Tables 1, 2 ,3, 4, 9, 10, and 12 came primarily from the NSF Main Database. For programs in EHR, the data was cross-checked against data collected by the programs and from program award sheets. Data on prior year funding came from reports prepared and published in 1994 and 1995 about awards in FY 1993 and FY 1994. Continuation numbers were collected by checking awards to two-year colleges made in FY 1992 – FY 1994. Information was further verified by reading abstracts. In a few cases, two-year institutions were not coded as two-year institutions in the main database. In other cases, institutions that have changed their status from a two-year institution to a four-year institution are still coded as two-year institutions in the main NSF database. These were not included. Data in Tables 5, 6, 7, and 8 were supplied from the NSF Main Database and the ATE Program records and verified by reading abstracts from the Advanced Technological Education program (ATE). Data in Tables 9 and 10 came from the Division of Undergraduate Education Instrumentation and Laboratory Improvement (ILI) program records and the NSF database. Data in Table 11 came from information provided by the principal investigators of Undergraduate Faculty Enhancement (UFE) projects.

Summaries include awards with either the principal investigator or a co-principal investigator from a two-year college. The exceptions to this are in the Alliances for Minority Participation (AMP), the Statewide Systemic Initiatives (SSI), the Urban Systemic Initiatives (USI), and the Collaboratives for Excellence in Teacher Preparation (CETP). It is difficult to determine the direct benefit to two-year colleges through these programs, although it is recognized that the benefit is substantial. Because the awards in these programs are very large and the number of principal investigators is often large, it was determined that including those amounts would skew the data. A conservative estimate is that 10% to 25% of those projects directly benefit two-year colleges. In addition, it is also conservatively estimated that most of the other AMP, SSI, and USI projects also provide up to 25% direct benefit to two-year colleges.

This report was prepared by the Division of Undergraduate Education. All information provided in the report has been verified and cross checked. While every effort was made to secure information from other sources, some information may be missing. In addition, program officers in Division of Elementary, Secondary, and Informal Education (ESIE), Division of Human Resource Development (HRD), Division of Research, Evaluation, and Communication (REC), Directorate for Computer & Information Science & Engineering (CISE), and Division of Educational System Reform (ESR) reviewed the information provided in this report.

NATIONAL SCIENCE FOUNDATION
ACTIVITIES IN SUPPORT OF TWO-YEAR COLLEGE
SCIENCE, MATHEMATICS, ENGINEERING, AND TECHNOLOGY EDUCATION

CHAPTER I
INTRODUCTION AND OVERVIEW

The National Science Foundation (NSF) continues to recognize and support the critical role that two-year colleges play in science, mathematics, engineering, and technology (SMET) education. Among NSF activities are: (a) grants made directly to two-year colleges, (b) collaborative efforts in which two-year colleges play a major role, (c) support of curriculum materials and faculty enhancement activities that benefit students and faculty in two-year colleges as well as others in the academic community, and (d) workshops, conferences, studies, and other special activities.

Direct NSF support to two-year colleges has increased almost six-fold from FY 1993 to FY 1996. Support grew from about $7.6 million in FY 1993 to over $44.0 million in FY 1996. A major component of NSF's support of two-year colleges is the Advanced Technological Education (ATE) program. ATE was created in FY 1994 and aimed primarily at two-year colleges and their academic and industrial partners. The ATE program accounted for approximately $23.7 million or about 54% of NSF support of two-year colleges in FY 1996. Funding continues to grow in other programs in the Directorate for Education and Human Resources (EHR). Support in the research directorates grew to $4.8 million in FY 1996 with much of that support coming from Computer and Information Science and Engineering.

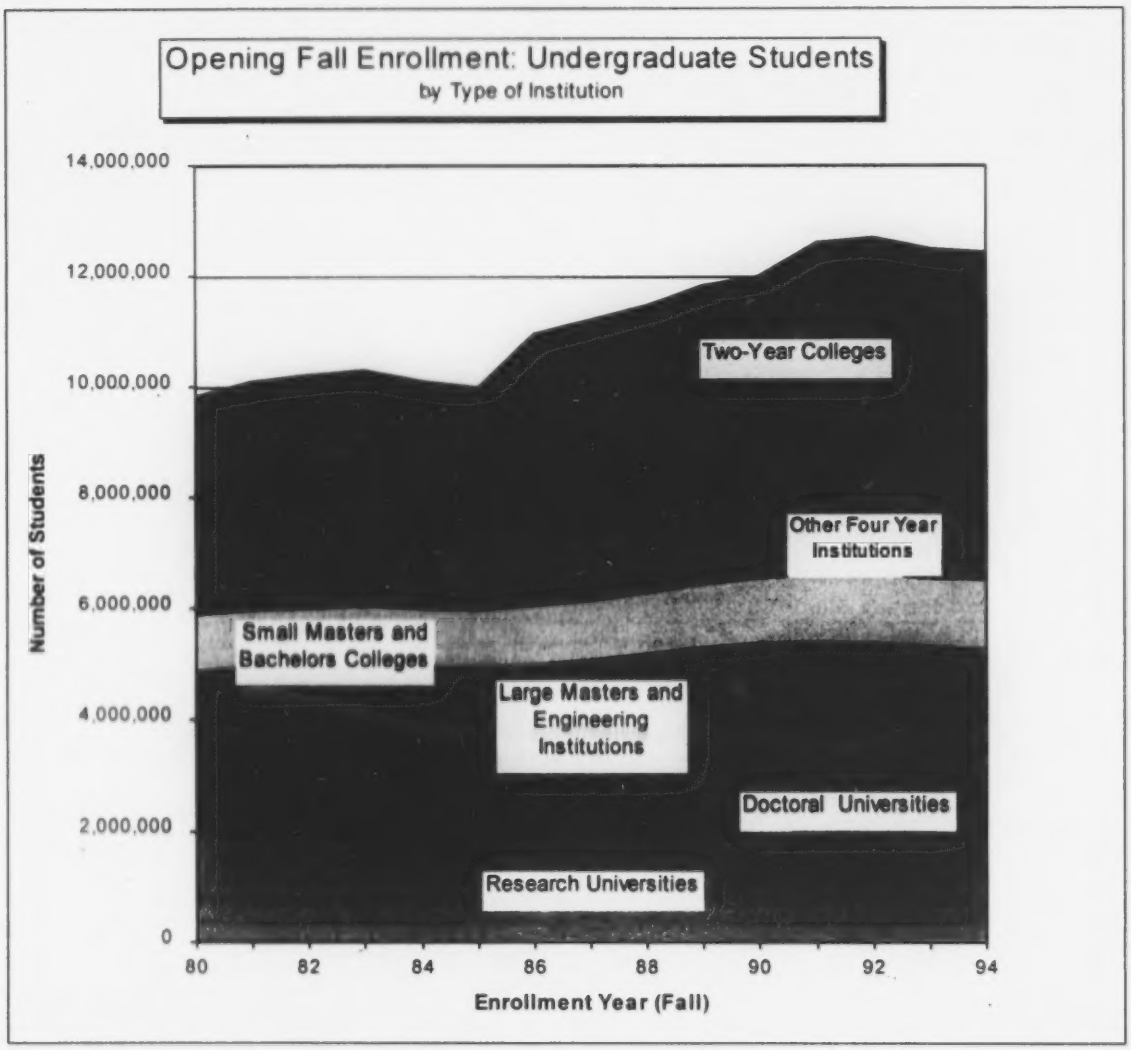
The Foundation's goal of improving and strengthening SMET programs for *all* students is reflected in its support to two-year colleges through leadership activities and program support. Two-year colleges provide a great diversity of learning objectives including: (a) courses of study that articulate with, and transfer to, four-year colleges and universities, (b) technical education and other career-oriented programs, (c) developmental education for students underprepared to begin college work, and (d) additional coursework for students who have baccalaureate and other advanced degrees but desire to change careers or seek professional advancement. Increasingly, teachers in the K - 12 system and those who earn PhDs in science fields originate their higher education or take some coursework contributing to their degree in two-year colleges. There is growing evidence in many states that a very large percentage of newly certified teachers have taken much or all of their SMET coursework in two-year colleges. This necessity for developing SMET preparation of future teachers is not well recognized among two-year college faculty or administrators.

This report focuses primarily on activities for two-year colleges that are supported by the Education and Human Resources Directorate (EHR), and in particular, the Division of Undergraduate Education (DUE). However, additional information on Foundation-wide activities is provided to set the report in a broader NSF context. The FY 1996 NSF awards highlighted in this report were made to two-year colleges in 41 states, the District of Columbia and Puerto Rico. Also, in the last several years, NSF has significantly increased the expertise of its own professional staff by adding permanent and rotating staff who have direct experience with two-year colleges and who have demonstrated leadership in the two-year college SMET community.

The two-year college is a relatively new entity in American higher education with the first Junior College opening slightly less than 100 years ago. Few two-year colleges existed until after World War II and most have opened in the past 37 years. Between 1960 and 1975, community colleges increased two and a half times in number, opening at a rate of almost one per week. As one indication of the tremendous growth of two-year colleges, from 1969 to 1992 enrollment in two-year colleges tripled to over 5.7 million students in credit classes. This enrollment accounted for 44% of the nation's undergraduates and 49% of first time

freshmen. About 27% of students in community colleges are underrepresented minorities. Women comprise 58% of community college enrollment.** As evidenced in Figure 1, the enrollment of undergraduate students in higher education is being dramatically changed by enrollments in two-year colleges.

Figure 1



The Division of Undergraduate Education (DUE) is the focal point of NSF activities in support of science, mathematics, engineering, and technology education in two-year colleges. Robert F. Watson, Director on Leave, Division of Undergraduate Education, serves as NSF's "Official Liaison with Community Colleges" as called for in the Scientific and Advanced Technology Act (PL#102-476). In FY 1996, DUE accounted for $21.2 million or 48% of the total NSF direct support to two-year colleges, as well as much of the collaborative support involving all DUE programs. (Table 1 and Figure 3)

** Data from ***National Profile of Community Colleges: Trends and Statistics FY 1995 - FY 1996*** published by the American Association of Community Colleges (AACC).

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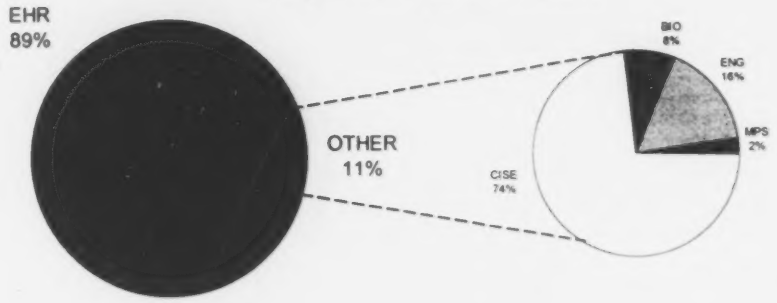
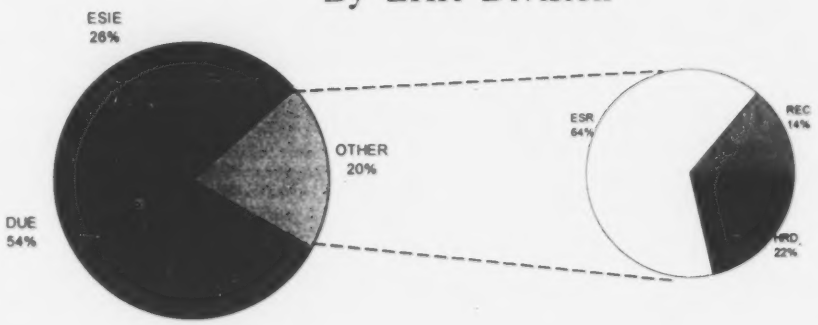
Figure 2

FY 1996 NSF Awards to Two-Year Colleges

By NSF Directorate



By EHR Division



KEY

Directorates:

BIO = Directorate for Biological Sciences
CISE = Directorate for Computer & Information Science & Engineering
EHR = Directorate for Education and Human Resources
ENG = Directorate for Engineering
MPS = Directorate for Mathematical & Physical Sciences

Divisions:

ESIE = Division of Elementary, Secondary, and Informal Education
ESR = Division of Educational System Reform
HRD = Division of Human Resource Development
DUE = Division of Undergraduate Education
REC = Division of Research, Evaluation, and Communication

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Table 1

NSF AWARDS TO TWO-YEAR COLLEGES FY 1993 - FY 1996

	FY 1993		FY 1994		FY 1995		FY 1996	
Directorate/Office	# Awards	Dollars (in 1000s)	# Awards	Dollars (in 1000s)	# Awards	Dollars (in 1000s)	# Awards	Dollars (in 1000s)
Office of the Director	4	$58	0	$0	0	$0	0	$0
Planning and Evaluation	0	0	1	59	1	5	0	0
Mathematical and Physical Sciences	1	66	4	346	2	185	2	109
Social, Behavioral, and Economic Sciences	2	132	1	80	0	0	1	98
Computer and Information Science and Engineering	11	295	29	951	19	836	18	3,482
Geosciences	0	0	0	0	0	0	0	0
Engineering	2	272	1	83	0	0	4	768
Biological Sciences	2	647	6	522	1	56	5	376
Total, Research Directorates	22	$1,470	42	$2,041	23	$1,082	30	$4,833
Education and Human Resources	101	$6,107	167	$21,433	169	$34,459	171	$39,197
TOTAL, NSF	**123**	**$7,577**	**209**	**23,474**	**192**	**$35,541**	**201**	**$44,030**
Estimated Out-Year Totals - EHR				**$39,000**		**$74,000**		**$86,000**
Estimated Out-Year Totals - NSF				**$44,000**		**$74,000**		**$94,000**

FIGURE 3

NSF Awards to Two-Year Colleges

FY 1993 - FY 1996

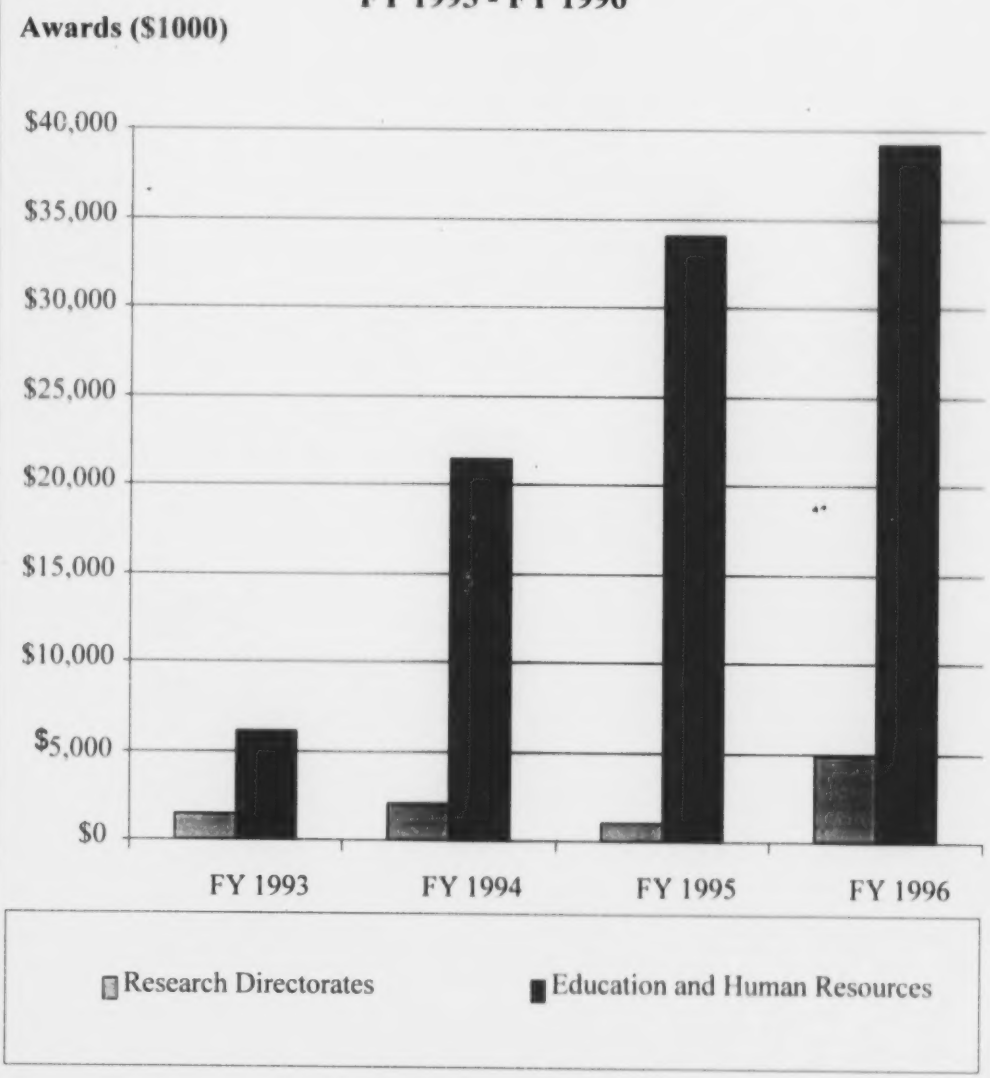


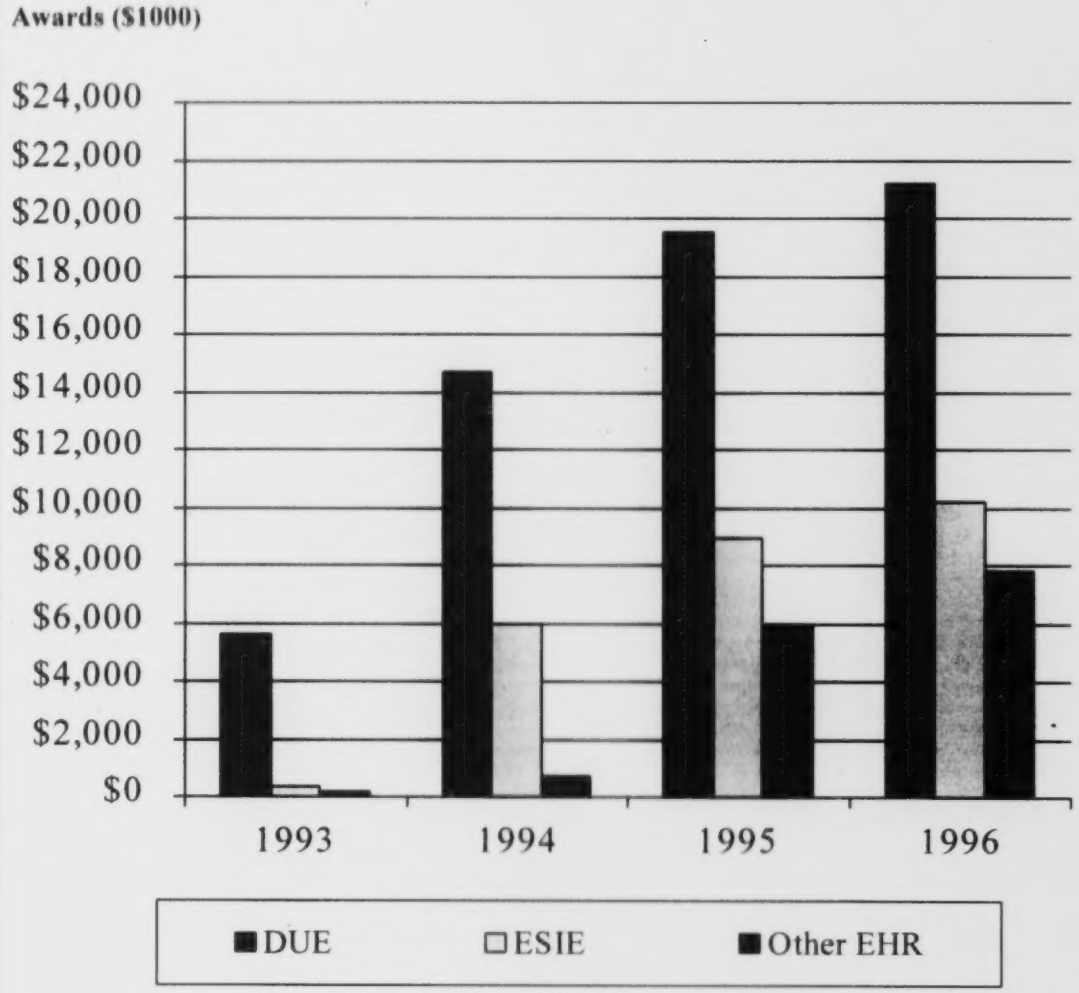
Table 2

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES
AWARDS TO TWO-YEAR COLLEGES
FY 1993 - FY 1996

	FY 1993		FY 1994		FY 1995		FY 1996	
Division/Offices	# Awards	Dollars (in 1000s)	# Awards	Dollars (in 1000s)	# Awards	Dollars (in 1000s)	# Awards	Dollars (in 1000s)
Undergraduate Education (DUE)	93	$5,603	126	$14,716	126	$19,517	129	$21,184
Elementary, Secondary, and Informal Education (ESIE)	6	330	33	5,987	33	8,975	31	10,216
Human Resource Development (HRD)	2	174	4	462	6	2,268	5	1,690
Graduate Education (DGE)	0	0	1	4	0	0	0	0
Educational System Reform (ESR)	0	0	1	140	1	1,600	3	5,052
Research, Evaluation, and Communication (REC)	0	0	2	124	3	2,099	3	1,055
TOTAL FOR EHR	101	$6,107	167	$21,433	169	$34,459	171	$39,197
Estimated Total Out-year Commitments				$39,000		$74,000		$86,000

FIGURE 4

Directorate for Education and Human Resources
Awards to Two-Year Colleges
FY 1993 - FY 1996



CHAPTER II
LEADERSHIP ACTIVITIES

Introduction

The Directorate for Education and Human Resources (EHR) has undertaken numerous leadership activities involving two-year colleges. Many of these activities are centered in the Division of Undergraduate Education (DUE) and the Division of Elementary, Secondary, and Informal Education (ESIE).

Outreach Workshops

In 1996, DUE and ESIE sponsored a series of regional workshops which targeted administrators and faculty members from two-year colleges. These workshops were held in Illinois, Mississippi, Virginia, Texas, Maryland, Missouri, Arizona, and the District of Columbia. The goals of the workshops were to (a) discuss with the two-year college community and their academic and industrial partners opportunities for two-year college funding, (b) encourage quality proposals from two-year colleges to more NSF programs, and (c) give the two-year college community an opportunity to interact with NSF program directors.

In addition, NSF program directors gave numerous presentations at professional meetings involving two-year colleges. Those listed below with an asterisk involved primarily two-year college faculty and administrators, while other meetings involved significant numbers of two-year college faculty. These include but are not limited to:

The American Mathematical Association of Two-Year Colleges (AMATYC)*,
The National Association of Biology Teachers (NABT),
The American Chemical Society (ACS),
The American Association of Physics Teachers (AAPT),
The Mathematical Association of America (MAA),
The National Council for Resource Development National Convention (NCRD)*,
Regional Technology Strategies*,
The League for Innovation in the Community College*,
American Association of Community Colleges (AACC)*,
Phi Theta Kappa*,
American Society for Engineering Education (ASEE),
Accreditation Board for Engineering and Technology (ABET),
American Society for Microbiology (ASM),
International Technology Education Association (ITEA),
American Vocational Association (AVA),
Frontiers in Education (FIE),
College-Industry Education Conference (CIEC),
Genetics Revolutions Conference (a special workshop on two-year college role in biology and biotechnology), and
National School-to-Work conference sponsored by the Institute for Education and the Economy.

FY 1996 Highlights: Advanced Technological Education

In March, 1996 the publication ***Advanced Technological Education: FY 1995 Awards and Activities (NSF 96-54)*** was published. This publication includes information about the ATE program and FY 1995 awards, a brief history of the ATE program, a listing of awards by types of technology, abstracts of all awarded projects, an index of awards by state, an index of principal investigators, and numerous maps.

NSF/EHR Study of Undergraduate Education

An ambitious year-long study that provides a detailed look at the state of undergraduate education in science, mathematics, engineering, and technology (SMET) in U.S. colleges and universities was completed in 1996. The study, the first of its kind in a decade, was conducted by a subcommittee of the EHR Advisory Committee. The study report, ***Shaping the Future: New Expectations for Undergraduate Education in Science, Mathematics, Engineering, and Technology***, (NSF 96-139), provides action-oriented recommendations for improving the quality of undergraduate education in SMET. It is broad in scope, reflecting the advice and contributions of hundreds of individuals representing the public and private sectors, professional societies, and diverse academic groups.

Within the context of a broader study of centrality and importance to society of an undergraduate education, the report urges attention to the needs of all undergraduate students in all types of educational institutions, recognizes the importance of two-year colleges as the starting point (and often re-starting point) in higher education for increasing numbers of students, and suggests increased attention to the potential role of two-year institutions in addressing the Nation's need for well trained K – 12 teachers.

The report provides a rich set of recommendations that, when taken together, constitute a coherent, broad-reaching call to action to improve SMET education for ***all*** undergraduate students. Four ideas constitute a firm foundation for this plan:

- Every undergraduate should have access to an excellent education in science, mathematics, engineering, and technology and be encouraged to study and learn these subjects.
- A flexible SMET curriculum should provide students with greater awareness of, and preparation for career opportunities.
- The educational environment should be supportive of students, promote active learning, encourage collaboration, and emphasize inquiry more than rote acquisition of facts.
- All links in the education chain, including K - 12, undergraduate, graduate, and professional schools, must work together to provide, assure, and reward sound learning.

Among the overarching findings of the study was that an excellent, engaging education in SMET subjects is critically important for ***all*** undergraduates, not solely SMET majors. Equally apparent in the report was the number of successful and encouraging improvements made over the past decade, many funded by NSF programs or driven by NSF-funded projects. Among these improvements are the increased use of, and emphasis on:

- flexible, modular curricula;
- introduction of complex concepts through practical, real-world scenarios;
- interdisciplinary and multidisciplinary collaboration;
- collaborative and active learning; and
- educational technology.

At the same time, several barriers to continued improvement are identified:

- dwindling resources;
- a rigid academic establishment resistant to change;
- high variability in the preparation and abilities of incoming students;
- ineffective or inefficient use of technology in instruction and learning;
- insufficient application of learning assessment and evaluation tools; and
- faculty reward systems inconsistent with the improvement of undergraduate education

The report strongly advises that SMET undergraduate education become:

- more central in the curriculum and in faculty rewards and recognition;
- more centered around the student and in the processes of the various disciplines;
- more connected with students' own experiences and to interdisciplinary content;
- more collaborative among students as well as across institutions, organizations, professional societies, and industry; and
- more comprehensive across each institution and in all institutions offering SMET education.

Shaping the Future Conference

In July 1996, teams from approximately 50 institutions, as well as about 500 individuals, attended the NSF National Conference ***Shaping the Future***. Twelve teams from two-year colleges, representing the six ATE Centers and the six two-year college Institution-wide Reform (IR) grantees, participated in and exhibited at the conference. Sessions focused on the needs and goals of institution-wide reform, perspectives from industry and employers, effective practices and collaborations, strategies for institution-wide reform, and plans for the future. A legislator's roundtable, a panel discussion by industry, a college president's forum, and a discussion of the ***NSF Review of Undergraduate Education*** along with the ***National Research Council (NRC) Year of National Dialogue*** were also featured.

Engineering Technology Education in Two-Year Colleges: National Agenda Workshop for the Future of Engineering Technician Education

The NSF Advanced Technological Education (ATE) Program funded a workshop, held in the fall of 1995, to design a national agenda for the future of engineering technician education. This workshop, hosted by Sinclair Community College in Ohio, was co-sponsored by the Engineering Technology Division of the American Society for Engineering Education (ASEE) and the Technology Accreditation Commission of ABET. Fifty-six participants from 25 states represented academic institutions, professional societies, and business and industry.

The purpose of the workshop was to identify the scope of changes that should occur beyond the turn of the century in engineering technician education, primarily in two-year colleges. The vision is creation of an environment for the delivery of affordable, accessible, and continuously improving associate degree engineering technician education which prepares graduates to succeed as contributing professionals in a world-class workforce. The publication resulting from the workshop, ***A National Agenda for the Future of Engineering Technician Education,*** was printed in 1996 and is available by contacting Al Wahle, Sinclair Community College, 444 W. 3rd Street, Dayton, OH 45402-1460, by calling 937-449-5107, or by e-mail <awahle@sinclair.edu>

Preparing the Knowledge Worker of the Future

In May 1996, the conference and exposition, Edu.Tech@Work, was sponsored by the ATE Northwest Center for Emerging Technologies (NWCET) and held in Bellevue, Washington. The title of the conference was ***Preparing the Knowledge Worker of the Future***. Bill Gates, Chairman and CEO of Microsoft, and Phil Condit, President and CEO Designate of Boeing, were featured. Concurrent sessions focused on education on the superhighway (distance learning, web authoring tools, and electronic classroom designs); (b) the knowledge worker (work is learning, information technology career clusters, recruiting and retraining knowledge workers, and teaching the teachers); (c) multimedia development and distribution (authoring tools, product development teams, copyright laws, and CD-ROM textbooks); (d) people and organizations for the 21st century (emerging industries, learning organizations, out-sourcing and in-house services, and reengineering the information technology staff); and (e) business and education partnerships that work.

Phi Theta Kappa Summer Internship Program

During the summer of 1996, NSF cooperated with Phi Theta Kappa, the international honor society for two-year colleges, to offer a summer internship program at NSF for two-year college honor students. Two summer interns worked cooperatively with DUE and ESIE on the ATE program and other two-year college activities. The internship program was designed (a) to allow students to work with senior agency staff on special projects; (b) to give them exposure to science, mathematics, engineering, and technology education programs; (c) to let them interact with policy makers; and (d) to give them experience working in an office. Information on the program can be obtained from Phi Theta Kappa, Washington Office, 444 North Capital Street NW, Suite 428, Washington, DC 20001 or by phone at 202-393-2624.

Ethics and Biotechnology: A Blueprint for the Future

In January 1996 a NSF supported workshop on ***Ethics and Biotechnology*** was hosted by the Biotechnology Center at Northwestern University. This workshop provided a blueprint for the incorporation of ethics in the teaching, practice, and management of biotechnology. A seamless strategy was used in which leaders from the K - 12 sector, community colleges, four-year colleges, research universities, industry, and professional societies worked together to develop a plan for the future. The goal was to assure that the United States maintains the highest standards of ethics in biotechnology education, both now and in the future. Principal investigators and other representatives from biotechnology programs funded by the ATE program were among the participants. An important aspect of the workshop was that it afforded an opportunity for leaders from a variety of different arenas to meet and address concerns that are important in a seamless implementation of ethics in science and biotechnology, primarily in two-year college biotechnology programs. The workshop proceedings entitled ***Biotechnology and Ethics: A Blueprint for the Future*** was published in 1996. Copies can be obtained by contacting the Center for Biotechnology, Northwestern University, 1801 Maple Avenue, Evanston, Illinois 60201 or by phone at 847-467-1453.

Community College Day at the National Science Foundation

On April 1, 1996, NSF recognized Community College Month by hosting, in cooperation with the American Association of Community Colleges (AACC), Community College Day. In addition to NSF staff, numerous community college faculty and administrators and professional society representatives

attended the event. Fred Haise, Apollo 13 astronaut and retired president of Northrup Grumman Technical Services, was the featured speaker. Haise is a graduate of Perkinston Junior College (now Mississippi Gulf Coast Community College). He received one of the AACC 1996 Outstanding Alumni Awards. His presentation focused on his experiences aboard the Apollo 13 Mission.

Community-Senior College Science and Mathematics Connection Conference

In October 1996, NSF supported a conference on ***Community-Senior College Science and Mathematics Connections***. The purpose of the meeting was to strengthen the teaching of science and mathematics and enhance the effectiveness of transition between two- and four-year colleges through improved cooperation and articulation in science and mathematics. Breakout sessions focused on such issues as:

- changes that must be made to improve the teaching of science and mathematics at two- and four-year colleges;
- networking and information exchanges to enhance cooperation between two- and four-year institutions; and
- proven practices that foster successful student transfer between two- and four-year colleges.

The proceedings of the conference were published in FY 1997; a website devoted to the meeting and follow-up is <http://www.orau.gov/orau/comtycol.htm>.

Cooperative Efforts with American Association of Community Colleges (AACC)

- **AACC National Convention**

  In April 1996, NSF sponsored a special session entitled ***The Increasing Reliance on Community Colleges: Programs at the National Science Foundation*** at the AACC 76th Annual Convention in Atlanta, Georgia. The session featured a two-year college president from a large suburban community college, an industry vice-president from Siemens Corporation, and a two-year college dean for academic affairs from a large urban community college. In addition, several two-year college grantees participated in forums. NSF had a booth in the exhibit area.

- **AACC Roundtable on Science, Mathematics, Engineering, and Technology**

  In May 1996, AACC, with NSF support, held a National Roundtable on Science and Engineering Technology Education. Eighteen national leaders plus six AACC staff participated in this exchange. Participants represented two-year colleges, four-year colleges and universities, secondary schools, industry, and government. Background papers by Beverly Simone, President of Madison Area Technical College, and Arnold Packer, Chairman of SCANS 2000 and member of Johns Hopkins Institute for Policy Studies, helped to focus initial discussions. A monograph of recommendations for community colleges entitled ***Improving Science, Mathematics, Engineering, and Technology Education: Strategies for the Community College*** was published in December 1996. Copies can be obtained by contacting AACC at One Dupont Circle Suite 410, Washington, DC 20036-1176 or by phone at 202-728-0200.

- **AACC National Videoconference**

  In September 1996, NSF and AACC jointly sponsored a national videoconference ***Leading the Nation: Innovation in Two-Year College Science, Mathematics, Engineering, and Technology Programs***. The purpose of this videoconference was to discuss: (a) involvement of two-year colleges in improvement of SMET education for all students; (b) relationship of two-year

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colleges with other levels of education such as secondary schools and four-year institutions to help ensure that two-year colleges are part of the continuum of education; (c) new and creative partnerships with business and industry; (d) innovative practices in SMET education in two-year colleges; (e) unmet needs of students, particularly those in two-year colleges who receive basic instruction both in SMET disciplines and in non-SMET disciplines which are becoming increasingly more dependent on more SMET knowledge; (f) infrastructure needs for best instructional practices; and (g) other issues which need attention before major changes can occur to raise the quality of undergraduate learning in SMET areas in two-year colleges. The videoconference highlighted two panels: one panel focused on partnerships and their roles in creating, developing, and sustaining innovative SMET partnerships in two-year colleges; the second focused on the role of community colleges in these transitions between educational levels and between education and the workplace. Neal Lane, Director of NSF, and David Pierce, President of AACC, gave the opening remarks. The conference also highlighted several innovative two-year college SMET programs.

Advanced Technological Education Principal Investigators Conference

In November 1996, AACC, in cooperation with NSF, sponsored the third annual Principal Investigators (PI) Conference on Advanced Technological Education (ATE). These ATE conferences are designed to help ATE award recipients think of the ATE program more broadly than just their own project and to consider how the ATE program as a whole can impact and improve technological education in this country. The purpose of the conference entitled ***Partnering with Business and Industry*** was (a) to allow ATE projects and centers to showcase their project accomplishments; (b) to focus on what constitutes effective partnerships between academic institutions and business and industry; (c) to emphasize the need to develop partnerships with business and industry and with the local community and subsequently foster and maintain these partnerships; (d) to facilitate the networking of projects and centers with each other and with industrial partners; (e) to discuss issues of interest and challenges common to ATE projects; (f) to highlight the leadership role of two-year colleges in SMET education for the technical workforce; and (g) to bring together leaders from two-year colleges with other stakeholders in advanced technological education (e.g., business and industry, secondary schools, government, professional societies) to plan for the future. The workshop involved more than 225 ATE PI's from about 100 of the currently funded ATE projects and centers. They represented two- and four-year colleges, universities, secondary schools, industry, and professional organizations interested in technician education. Accompanying the PIs were over 60 industrial partners representing large, small, and medium size companies. Three pre-conference workshops focused on (a) NSF grant management and audit procedures, (b) effective project evaluation, and (c) establishing effective two-year college and high school ATE student internships and cooperative education experiences. Conference participants reflected upon the positive impact that the National Science Foundation ATE program has made toward educating a highly qualified workforce for the future. Each of the 100 ATE projects and centers participated in one of two showcases. The activity and energy at the showcases were extremely high as PIs actively engaged each other and networked for more interactions at later times. A conference highlight was a plenary address by Roberts Jones, President of the National Alliance of Business, who discussed new paradigms for interactions between two-year colleges and business and industry to prepare the workforce for today and tomorrow. Other conference activities included a panel discussion on industry/college partnerships, a panel discussion on national standards (mathematics and science academic standards, school-to-work standards, voluntary industry standards, professional accrediting

standards, and industry standards such as ISO 9000 and ISO 14000) and their impact on two-year college programs, and an examination of the impact of the undergraduate study on two-year colleges and the role that two-year colleges should play in implementing its recommendations (See page 10).

NSF Dynamic Partnerships Conference

In June 1996, special sessions focusing on two-year colleges were held at the NSF/EHR working conference entitled ***Dynamic Partnerships: Seeding and Sustaining Education Reform***. The purpose of the conference was to show how collaborations and partnerships play a critical role in the success of science education reform. Special emphasis was placed on building successful partnerships and alliances to leverage scarce resources, synthesize activities, and introduce change that improves the teaching and learning of science, mathematics, engineering, and technology. Sessions also provided evidence that partnerships and collaboration are requirements, not options, for successful and sustainable reform. One session highlighted *Introductory Biology for Undergraduates: A New Model*. This project, being led by the Biological Sciences Curriculum Study (BSCS), is a joint effort of eight community colleges, AACC, the two-year section of the National Association of Biology Teachers (NABT), the Society for College Science Teaching, and several other professional societies and publishing companies. The materials help students (a) to better understand the fundamental processes of biology, (b) to enhance their scientific reasoning and critical thinking skills, and (c) to better understand how science relates to everyday life. A second session highlighted the *South Carolina ATE Exemplary Faculty Project* which is aimed at restructuring the learning environment in the 16 South Carolina two-year technical colleges. This project involved interdisciplinary college faculty teams in intensive faculty development activities, a system-wide electronic network, and a project-based team approach to designing and implementing curriculum materials and instructional strategies. Collaborative partners included the South Carolina Department of Education, the Virginia Community College system, approximately 30 industrial partners, and many other four-year college and secondary school academic partners.

CHAPTER III
THE ADVANCED TECHNOLOGICAL EDUCATION PROGRAM

Both Congress and the White House recognize the importance of the technical workforce to a globally competitive economy; thus, the *Scientific and Advanced Technology Act of 1992* called for the National Science Foundation to establish a national program to improve the education for technicians in advanced technology fields by utilizing the resources of the nation's two-year colleges. In August 1993, NSF announced the **Advanced Technological Education (ATE)** program. These efforts created a sound foundation for cultivating innovative programs to advance technological education in the United States.

The primary purpose of the Advanced Technological Education (ATE) Program is to promote exemplary improvement in technician education at the national and regional level through support of curriculum development and program improvement, particularly in two-year colleges and secondary schools. All projects and centers have a vision for technician education for the high performance workplace. This vision is used to guide project development. Curriculum development encompasses the design and implementation of new curricula, courses, laboratories, and instructional materials. Program improvement encompasses faculty and teacher development, student academic support, and formal cooperative arrangements among institutions and other partners. The ATE projects and centers not only prepare students to enter the technical workforce, but also provide a solid foundation for continued higher education. The ATE program is jointly managed by the Division of Undergraduate Education and the Division of Elementary, Secondary, and Informal Education. A full report on the FY 1996 ATE program can be found in the NSF publication ***Advanced Technological Education: 1996 Awards and Activities*** **(NSF 97-50).**

The ATE program made its first awards in the summer of 1994. As of December 1996, the ATE program is supporting eight Centers of Excellence and about 100 projects. Centers focus on systemic approaches to technician education usually within a specific discipline. However, they are also expected to have a broad impact on two-year colleges, secondary schools, the region, and the nation. Projects focus on one or more specific aspects of technician education such as curriculum or instructional materials development, faculty or teacher preparation or enhancement, technical experiences for students, or laboratory development. There are cooperative efforts among projects and centers to assure that the ATE program is having a national impact. The NSF acts as a partner in these efforts by holding annual principal investigator meetings and supporting other efforts which encourage networking and joint activities.

The ATE Centers serve as national and regional models and clearinghouses for the benefit of both colleges and secondary schools. An essential feature of centers is active participation in the educational process by both academia and the private and public sectors served by the educational system.

While all current Centers have two-year colleges as the lead institution, Centers are cooperative efforts among two-year colleges, four-year colleges and universities, secondary schools, industry, business, and government. In particular, ATE Centers:

- assure that students acquire strong backgrounds in mathematics, science, and technology;
- prepare these students for the high performance technological workplace;
- serve as exemplars for partnering with business and industry;
- enhance faculty and teachers in these programs;
- act as models for other institutions; and
- yield nationally-usable educational products.

In the third year of the program, 36 of the 120 proposals submitted were funded, for a funding rate of 30%. These new awards went to institutions in 21 states. With ATE projects continuing from FY 1994 and FY 1995, those co-funded with other projects, and new awards, ATE projects are currently being supported in 36 states plus the District of Columbia.

TABLE 3

ATE Proposals Received for the February 1, 1996 Deadline

Type of Proposal	Number
Centers of Excellence	18
Projects in Advanced Technological Education	102
Total Number of Formal Proposals Received	120
Total Dollars Requested:	$186 M

For FY 1996, NSF awarded a total of $23.7 million for ATE-related activities. Since ATE funds are divided between the Division of Undergraduate Education (DUE) and the Division of Elementary, Secondary, and Informal Education (ESIE) in the ratio 2:1, approximately $15.2 million was provided by DUE and $7.5 million by ESIE. As can be seen in Table 3, 120 proposals were received requesting about $186 million. Table 4 provides relevant information about the current year and out-year commitments for the program.

As seen in Table 4, ATE partially or fully supported 15 projects submitted to other programs that directly benefited technician education. These included three Course and Curriculum Development projects, five Chemistry Initiative projects, three Mathematics and Their Applications Across the Curriculum projects, one Instructional Materials Development project, one Teacher Enhancement project, one Young Scholars project, and one Research Experiences for Undergraduates project. Other NSF programs contributed funds to four ATE projects. The Teacher Preparation Program in DUE-contributed $320,000 to three of the ATE Centers for special activities that prepare future K - 12 teachers, and the Studies and Indicators Program contributed $50,000 to an ATE special study.

TABLE 4

Award Statistics in the ATE Program
FY 1996
(Dollars in Millions)

TYPE	NUMBER	FY 1996	FY 1997 (Outyear)	FY 1998 (Outyear)	TOTAL
Centers, New	2	$1.37	$1.39	$1.87	$4.63
Projects, New	34	8.26	4.53	1.79	14.58
Centers, Continuing	6	5.29	2.90	-	8.19
Projects, Continuing	17	5.56	1.77		7.33
Special Projects	4	0.45	.40	.26	1.11
Leadership Activities		1.52			1.52
Total	63	$22.45	$10.99	$3.92	$37.36
Contributions to Other Programs	15	0.85	.54	.36	1.75
Contributions from Other Programs		.37	.37	.07	.81
Total	78	$23.67	$11.90	$4.35	$39.92

As shown in Table 5, the awards cover a wide range of advanced technological education fields including biotechnology, environmental technology, computer and information systems technology, chemical technology, manufacturing technology, electronics, geographic information systems technology, telecommunications, instrumentation and calibration technologies, and laser technology and core courses such as mathematics, physics, biology, chemistry which serve to undergird such programs.

TABLE 5

Award Distribution by Focus Area in the ATE Program
FY 1996
DUE and ESIE

	Continuing	New
Science Technologies including Biotechnology, Chemical Technology, Computer Technology, and Environmental Technology	21	10
Engineering Technologies including Manufacturing, Electronics, Aerospace, Technology, Geographic Information Systems,	32	18
Core Courses including Mathematics, Physics, Technology Education, and Multi/Interdisciplinary	17	8
Total Awards Among Projects submitted to the ATE program	**70**	**36**

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In FY 1996, two new Centers of Excellence in Advanced Technological Education were awarded:

- The Maricopa Advanced Technology Education Center (MATE) is focusing on semiconductor manufacturing and related supporting industries. Primary objectives include creating new curricular systems and materials, providing technical support for faculty who prepare students for these technical careers, and increasing the number of students who prepare for and become employed by the semiconductor manufacturing industries. The Center is a joint effort of the Maricopa Community College District; ten semiconductor manufacturing firms including Intel, Motorola, SGS-Thompson, and Microchip Technology; SEMATECH; two Tech-Prep consortia involving 13 secondary schools; and three other community college districts.

- The South Carolina Advanced Technological Education Center is creating a more highly educated technical workforce in advanced engineering technology fields. Objectives focus on curriculum reform, program improvement, and faculty development. Curriculum reform combines development of an integrated/coordinated engineering technology core using a systems-based approach along with advanced specialty courses. Faculty development focuses on use of interdisciplinary teaching teams. The Center involves the South Carolina Technical/Community College System as well as all 16 technical colleges in South Carolina and over 25 other educational institutions, governmental agencies, and businesses in active roles including Clemson University, the South Carolina State Department of Education, the South Carolina NSF Statewide Systemic Initiative (SSI), Bell South, Michelin, Bose, Robert Bosch, and NCR.

The two new Centers join the six continuing Centers funded originally in FY 1994 and FY 1995.

- The New Jersey Center for Advanced Technological Education led by Middlesex County College is creating a new associate's engineering technology degree program to meet the demand for multifunctional engineering technicians. This new program being developed by community colleges is derived from combining mechanical, computer, telecommunications, and electronics technological programs. The program begins in grade 11, continues through the associate degree, and articulates with baccalaureate programs at New Jersey Institute of Technology for engineering technology programs and with Trenton State's program in technology education to prepare future secondary teachers.

- The Northwest Center for Sustainable Resources led by Chemeketa Community College in Oregon is a collaborative effort of secondary schools, community colleges, four-year institutions, industries, government agencies, Native American tribes, and applied international research groups. Associate degree natural resource technology programs incorporate higher levels of mathematics and science using an ecosystems approach that emphasizes sustainable methods of resource utilization. Program graduates enter employment as advanced technicians in a variety of science-based occupations including forestry, fishery, environmental restoration, and geographic surveying, or they may continue for baccalaureate and other advanced degrees.

- Bellevue Community College in Washington, in collaboration with industry, government, secondary schools, other community colleges, and four-year institutions, is leading a new Center in Information Technology to respond to industry's need for well-trained technicians. The Center, with strong input from industry, is developing articulation standards and model associate degree programs particularly for information science. Microsoft and Boeing, as well as many small to medium size companies in the Seattle area, are active partners in the Center. These companies provide personnel as well as financial resources.

- The Advanced Manufacturing Center, housed on the campus of Sinclair Community College in Ohio, is a joint effort of Sinclair, the University of Dayton, numerous local industries, and secondary schools. It includes community colleges in three other states in development activities with other involvement planned in beta testing stages. The Center is acting as a catalyst to improve science, mathematics, and advanced manufacturing instruction by developing an advanced manufacturing curriculum that begins in grade 11, continues through the associate degree program, and culminates in a bachelor's degree. The curriculum covers writing, pilot testing, and publishing curriculum materials; and disseminating the curriculum, instructional materials, and model program nationally.

- The Environmental Center is a joint effort of Eastern Iowa Community College, Kirkwood Community College, Hazardous Materials Training and Research Institute (HMTRI), and Partnership for Environmental Technology Education (PETE) and involves over 500 community colleges in dissemination efforts. The Center is developing nationally validated curriculum models and instructional materials; establishing comprehensive programs of professional development; serving as a clearinghouse for environmental education information; and acting as a hub for the networking of environmental educators, business and industry, federal agencies, and professional societies.

- The Distance Education Center led by Texas State Technical College in Sweetwater involves many institutions in Texas, New Mexico, and Oklahoma. The project is developing the infrastructure and pedagogy to deliver many technical courses through distance learning. These include existing courses in Computer Aided Design/Computer Aided Manufacturing/Computer Integrated Manufacturing (CAD/CAM/CIM) as well as new AAS programs in polymer technology and electro-mechanical technology to complement needs of local industry. The ATE project is pioneering this model for managing distance education among separate and diverse institutions that are collaborating to share their resources and to expand opportunities available to students. Sub-projects within the Center have developed Internet and HTML-based curricular materials to enhance interactive video instruction both synchronously and asynchronously.

Besides the two new Centers, in FY 1996, the ATE program supported 34 new projects. For example:

- Edmonds Community College in Washington state is developing a ChemCore curriculum that serves as a basis for a laboratory technician program. This program integrates laboratory chemistry with five new academic courses in instrumental analysis, information technology, management, technical writing, and applied communications. Goals include development of an interdisciplinary, transferable laboratory curriculum and preparation of students with interdisciplinary knowledge, skills, and experiences required for employment as laboratory technicians.

- Springfield Technical Community College (STCC) is undertaking an ATE project in telecommunications and network engineering technology education. The project is a collaborative effort of STCC with the Universities of Connecticut and Hartford and the Springfield public schools. Its purpose is to develop an integrated curriculum, a teacher training model, and a model laboratory that meets the educational needs of the telecommunications and networking industries in the 21st century.

- Desert Research Institute in partnership with the Community College System of Nevada, Colorado Mountain College, and the University Corporation for Atmospheric Research is developing computer-interactive training modules in atmospheric technology designed to support environmental technology degree curricula at community colleges nationwide.

- Capital Community Technical College, in cooperation with the American Mathematical Association of Two-Year Colleges (AMATYC) and NASA, is designing a series of activities for community and technical college students in mathematics and science based on a collection of real world technical applications from the fields of aeronautics and space.

- The Geological Society of America (GSA) is involving faculty from two-year and four-year colleges and secondary school teachers in a series of workshops which emphasize hands-on experiences in data acquisition, manipulation, and presentation technologies for the earth and space sciences. In particular, the project is exploring such technologies as Geographical Information Systems (GIS), Global Positioning Systems (GPS), multimedia, Internet, and image processing.

- The University of Cincinnati College of Applied Science and the American Chemical Society are developing a project to help provide chemistry-based technicians with the skills and education required for successful careers in laboratories and plants throughout the United States. Activities focus on facilitating the development of networked alliances for chemical technician education, developing and evaluating curriculum and instructional materials based on the voluntary industry standards for chemical technicians, and enhancing two-year college and high school teachers involved in chemical technician education.

The ATE program continues to fund projects begun in previous years. Among these are:

- Seminole Community College in Florida is developing a new and innovative curriculum for introductory college physics. The course targets students in technology courses while maintaining the rigor that makes it transferable to four-year colleges and universities. It emphasizes a hands-on approach and motivates students to see connections between physics and their chosen fields.

- Wentworth Institute of Technology in Massachusetts is creating, through joint efforts of mathematics and technical faculty, laboratory investigations using engineering laboratories and multimedia simulations that illustrate mathematical concepts.

- Prince George's Community College in Maryland is leading a consortium of 12 community colleges, each linked to a NASA Center, to conduct faculty enhancement workshops in remote sensing, image processing, and geographic information systems. They are also developing an earth systems science course and interdisciplinary modules that can be infused into science and technology courses.

- Johns Hopkins University is leading a cooperative effort which represents five different consortia of community colleges (including over 130 community colleges) to develop instructional modules in science, mathematics, manufacturing technology, and technical communications to infuse into courses that comprise a broadly accepted, portable associate's degree in manufacturing. Curriculum materials are based on Secretary's Commission on Achieving Necessary Skills (SCANS) competencies.

- Texas State Technical College at Waco is leading a multi-state effort to develop curricula and laboratory materials to enhance student learning in advanced technologies for 15 occupational areas supporting American machining and machine tool industries. Key goals include providing highly multi-skilled graduates, producing upgraded and new educational materials, working closely with college and industrial partners to validate competencies and materials, and preparing a national model for apprenticeships and internships.

In addition to projects which were submitted to the ATE program, several projects in other programs were co-funded by ATE. For example:

- For the five Chemistry Initiative awards, the ATE program is contributing funds to ensure that curricula developed through those awards are tested in and adapted for appropriate technical programs such as those that prepare chemical, environmental, or biomedical technicians.

- The ATE program is supporting Dickinson College in their Workshop Physics project. The methods and materials which emphasize hands-on laboratory exercises are particularly applicable to two-year college technical programs.

- The ATE program is contributing to a teacher enhancement project at Mississippi State University which is directed at student transition to the workplace through manufacturing experiences. Physics and Tech-Prep teachers are participating in a five week program that includes three weeks with Peavey Electronics Corporation and two weeks of materials development at Mississippi State.

Special projects being supported through the ATE program include:

- City Colleges of Chicago plans a national conference that supports partnerships between urban community colleges and industry to prepare urban students to enter and succeed in the workforce. The conference will involve the city mayor's office, business and industry, the Superintendent of the public schools, and Chancellor or President of the community college system in nine major cities.

- Phi Theta Kappa, the honor society for community colleges, is developing and conducting a multi-component faculty enhancement and curriculum development project to strengthen SMET education in two-year colleges. The project is accomplishing its goals through activities that stimulate and assist other community colleges to replicate effective NSF supported community college curriculum materials and faculty development projects.

- The American Association of Physics Teachers (AAPT) is establishing a network of physics faculty in two-year colleges that consists of 15 regional organizations, coordinated and linked by a national steering committee. The purpose is to help improve learning opportunities for students in two-year colleges including those who transfer, those who become technicians in the high-technology workplace, and all students for whom physics serves as part of their college education.

- The American Association of Community Colleges (AACC) is coordinating a series of activities including (a) a Round Table of national leaders to develop recommendations regarding SMET education in two-year colleges to be published as an AACC monograph, (b) a National Videoconference *Leading the Nation: Innovation in Two-Year College Science, Mathematics, Engineering, and Technology Programs*, and (c) a yearly meeting of persons interested in advanced technological education including all the principal investigators of ATE projects.

The projected national impact of the ATE program is large, especially that of the eight Centers and large curriculum and faculty enhancement awards. The Northwest Center for Emerging Technologies (NWCET) estimates that it will affect, during a five year period, over 5,000 college students, 350 faculty and high school teachers, and 2,700 high school students. The Environmental Center estimates that in the first three years of its award, it will directly impact 300 community college teachers, 300 secondary school teachers, and 5,500 students. The Maricopa Community College District estimates that it will directly impact 360 college faculty, 430 secondary school teachers, 2,500 college students,

and 6,000 high school students directly in the program with many more affected from secondary efforts in mathematics and science. The South Carolina Technical/Community College Center in engineering technology is affecting 500 college faculty, 500 high school teachers, 5,000 college students, and 5,000 high school students.

The largest projects are developing and testing curriculum nationwide or are engaged in faculty enhancement activities. For example, the Miami University Middletown project plans to affect 600 secondary school teachers and college faculty in faculty enhancement workshops and 20 in curriculum development efforts. Assuming each teacher or faculty member directly impacts 100 chemistry or chemical technology students per year, this will result in 60,000 students being ultimately impacted by the project.

TABLE 6

Projected Impact of the FY 1996 Grants in the ATE Program

1st Year Impact (36 new awards):	2,160 Teachers/ Faculty	216,000 Students
3-Year Impact (36 new awards):	6,480 Teachers/ Faculty	648,000 Students
FY 1996 Impact of all ATE Awards Active in FY 1996: (105 active awards + 9 special active projects)	6,840 Teachers/Faculty	684,000 Students
3-Year Impact of FY 1994-96 ATE Projects (234 awards*)	14,040 Teachers/Faculty	1,404,000 Students

* 58 FY 1994 awards, 71 awards active in FY 1995, and 105 awards active in FY 1996

This table assumes that each project funded in FY 1996 or before will impact an average of 60 teachers or faculty members and that each teacher or faculty member will directly impact 100 students. As can be seen by numbers in preceding section estimated by projects, this is a conservative estimate.

Monitoring of the ATE program is multifaceted. It includes National Advisory Boards and National Visiting Committees; site visits by program directors and contractors; monitoring and technical assistance through a contract to WestEd; yearly ATE Principal Investigators' meetings; annual reports, final reports, and other self-reporting mechanisms. Among the strengths of the ATE projects often reported are:

(a) creative approaches to education that involve students and faculty in hands-on activities that reflect real-world problems;
(b) faithfulness to the ATE program in preparing students for high technology positions, particularly through interactions with business and industry; and
(c) significant regard to articulation between secondary schools and two- and four-year institutions.

Evaluators of projects are reporting numbers that meet or exceed expectations. For example:

- The Northwest Regional Educational Laboratory, which is conducting the evaluation of the Mt. Hood Community College (MHCC) mathematics project, reports that the textbook produced by the project and published by Saunders College Publishing, ***Interactive Mathematics III*** is being used a) in 23 sections at MHCC by 11 different instructors and will reach 805 students and (b) in 42 sections at 18 other community colleges and one high school and will reach approximately 1500 students.

- The Eastern Iowa Advanced Technological Environmental Education Center (ATEEC) evaluator reports that in FY 1996:

  a) 38 teachers and faculty from 21 states participated in an intensive two week summer institute,
  b) over 600 college and high school educators and environmental practitioners attended six regional two to three-day workshops,
  c) over 6,500 newsletters were published and disseminated,
  d) over 100 models of curriculum materials in environmental education were collected. Nineteen were placed on Websites. Over 58 institutions have reported they have accessed and used these sites,
  e) 30 business and industry leaders participated in a three-day workshop to help define environmental technician needs and skills, and
  f) over 4,200 copies of ***Partnering to Build a Quality Workforce*** report were distributed.

- California State Hayward reports on the Faculty and Teacher Enhancement survey form that for the 1996 summer workshop 83 teachers applied for 48 slots and 50 attended. These are intensive workshops involving 10 days each summer for two summers plus 6 days during each academic year. Other teachers and faculty are involved in presenting workshops and seminars.

CHAPTER IV
DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES

Introduction

The Directorate for Education and Human Resources (EHR) is responsible for the health and continued vitality of the Nation's science, mathematics, engineering, and technology education and providing leadership in the effort to improve education in these areas. Within EHR, seven divisions, Undergraduate Education (DUE), Graduate Education (DGE), Experimental Program to Stimulate Competitive Research (EPSCoR), Elementary, Secondary, and Informal Education (ESIE), Educational System Reform (ESR), Human Resource Development (HRD) and Research, Evaluation, and Communication (REC) are the focal points for these efforts. Many of these divisions directly support efforts in two-year colleges.

Division of Undergraduate Education (DUE)

Faculty members who vigorously combine teaching with scholarship are essential to the creation of vital science, mathematics, engineering, and technology (SMET) education. The Foundation seeks to provide incentives and rewards to stimulate and motivate faculty members so that creative teaching and instructional scholarship become a part of the "faculty culture" at all institutions. Faculty members who are primarily teachers need opportunities to deepen their knowledge as well as opportunities to work in the creative renewal of undergraduate courses, curricula, and laboratories.

DUE provided direct support to two-year colleges in FY 1996 through the following programs:

- **Advanced Technological Education (ATE)** for the development of courses, curricula, and faculty and teacher preparation and enhancement to improve the quality of education for science and engineering technicians;
- **Instrumentation and Laboratory Improvement (ILI)** for the development of new or improved laboratory courses or experiments;
- **Course and Curriculum Development (CCD)** for projects to improve the quality of courses and curricula;
- **Undergraduate Faculty Enhancement (UFE)** to enable faculty members to learn about new techniques and developments in their fields; and
- **Institution-wide Reform (IR)** to encourage colleges and universities that have begun to develop innovative curricula and courses to capitalize on these investments and convert successful innovation into pervasive institutional reform that will benefit all students.

The next several sections of this report exhibit DUE support through those programs.

Table 7

DIVISION OF UNDERGRADUATE EDUCATION GRANTS TO TWO-YEAR COLLEGES BY PROGRAM FY 1996

Program	Number of Awards	Dollars (in $1000)
ILI	62	2,209
CCD	6	1,111
UFE	9	1,015
ATE	42	15,533
IR	6	1,050
Other	4	266
Totals	**129**	**$21,184**

Table 8

DIVISION OF UNDERGRADUATE EDUCATION NUMBER OF GRANTS TO TWO-YEAR COLLEGES BY PROGRAM FY 1990 - FY 1996

Program	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996
ILI	48	54	53	63	60	57	62
CCD	1	8	12	17	14	13	6
UFE	1	2	8	13	13	11	9
ATE	-	-	-	-	37	42	42
IR	-	-	-	-	-	-	6
Other	0	0	0	0	2	3	4
Totals	**50**	**64**	**73**	**93**	**126**	**126**	**129**

DUE also provided support through consortia activities involving two-year colleges in such programs as the NSF **Collaboratives for Excellence in Teacher Preparation, Systemic Changes in the Chemistry Curriculum**, and **Mathematical Sciences and Their Applications Throughout the Curriculum.** In addition, several awards were made through **UFE** and **CCD** to four-year institutions which were designed primarily to support two-year college curriculum development or faculty enhancement. For example:

- The NSF **Collaboratives for Excellence in Teacher Preparation** program involves two-year colleges in collaborative activities with four-year colleges and universities. Two-year colleges serve

both (a) students who are part of the future K –12 teaching workforce and (b) returning students with undergraduate degrees who lack the mathematics and science needed for certification. Two-year colleges are involved in all Collaboratives. For example, two-year colleges play a major role in the Collaborative award to Montana State University. Six two-year tribal colleges are among the twelve participating institutions of higher education in the state. The primary focus of the Montana Collaborative is to increase the number of Native Americans in the nation's teaching workforce who are well-educated in science and mathematics. This Collaborative recognizes that two-year colleges are vital to this effort. In 1994, 14 of the 42 students who received NSF scholarship support in Montana were attending tribal, two-year colleges. The Rocky Mountain, Dominguez Hills, and Arizona State Collaboratives also involve two-year colleges in substantive ways. In several cases community college faculty are co-principal investigators or are taking other leadership roles in the projects. Faculty from both two-year and four-year institutions are addressing reform in chemistry, mathematics, and diversity initiatives. For example, in the Rocky Mountain Collaborative the Community College of Denver is experimenting with tandem arrangements in chemistry and mathematics courses to enable students to take these courses as a cohort group and organize cooperative study groups.

- Two-year colleges were involved in all of the awards made in the newly initiated **Systemic Changes in the Chemistry Curriculum**. For example, CUNY City College and partner community colleges in New York City have a project to redesign and modernize the undergraduate chemistry curriculum which focuses on a new teaching model - ***Workshop Chemistry***. The University of Wisconsin-Madison and Madison Area Technical College through the ***New Traditions Project*** are impacting the chemistry curriculum and technician education by innovations in several areas: student-focused active learning; inquiry-based, open-ended laboratories; interdisciplinary courses; topic oriented curriculum; and information technology/computer tools. The ***ChemLinks*** project centered at Beloit College is actively involving the Advanced Technology Environmental Education Center (ATEEC) as well as other two-year colleges in a project that is working closely with the ***Modular Chemistry Consortium*** project that includes the University of California-Berkeley and 17 other two- and four-year colleges and universities. These two groups are developing modules that present chemistry in the context of real-world problems. By involving many two-year colleges, these projects are having an impact on chemistry courses taken by students in transfer programs as well as those in two-year technical programs.

- In the **Mathematical Sciences and Their Applications Throughout the Curriculum** program most projects also involve two-year colleges in major ways. For example, ***Project Inter-Math*** led by COMAP and the United States Military Academy involves two-year colleges such as Austin Community College, liberal arts colleges, engineering schools, historically black colleges, and research universities. The project's vision is to establish environments conducive to interdisciplinary cooperation for designing and presenting instruction in all partner disciplines. Teams at each institution consist of faculty from several disciplines who collaborate to develop course materials entitled ***Interdisciplinary Lively Applications***. These projects are being used as a vehicle to move from disconnected mathematics courses to a fully integrated undergraduate experience. The Chair of their National Visiting Committee is from a two-year college. In the ***Long Island Consortium for Mathematical Sciences Throughout the Curriculum***, faculty from 10 colleges, including Nassau and Suffolk Community Colleges, are designing a comprehensive, multifaceted project to develop an environment for interconnected learning in mathematics courses and in mathematically based disciplines. Regional connectivity of different types of institutions joins energized faculty for substantive change in modes of instruction, course content, educational technology, and coordination of instruction across departments.

- DUE also supported several universities and colleges to work with two-year college faculty in curriculum development or faculty enhancement. For example, the Biological Sciences Curriculum Study (BSCS) group is conceptualizing, writing, testing, and evaluating a set of innovative curriculum materials. This project entitled ***A New Model for Introductory Biology at Two-Year and Community Colleges*** has 15 partners including biology faculty at eight community colleges, the American Association of Community Colleges (AACC), the two-year section of the National Association of Biology Teachers (NABT), the American Mathematical Association of Two-Year Colleges (AMATYC), and the college division of Kendall/Hunt. The program is designed to help students understand basic unifying principles of biology, develop fundamental skills of critical thinking and scientific reasoning, and recognize applications of science. As another example, the University of California at Davis has a project entitled ***Introduction to Molecular Biology and Molecular Diagnostics: Continuing Education for Community College Science Faculty*** to offer workshops for faculty as well as internships and research experiences.

Instrumentation and Laboratory Improvement (ILI)

The Instrumentation and Laboratory Improvement (ILI) program supports the development of new or improved laboratory courses or experiments in science, mathematics, engineering, or technology. The dominant part of the program is Instrumentation Projects (ILI-IP) which provide matching grants for equipment to carry out a proposed project. These projects then serve as models for the use of instrumentation at other institutions. Grants in the ILI program have been made to about 300 departments in two-year colleges over the past six years (See Tables 9 and 10). Examples include:

- Panola College in Carthage, Texas, has created a computer laboratory that encourages active student learning and greatly increases the students' appreciation for, and understanding of, concepts of motion and energy in physics courses.

- A similar laboratory at College of the Redwoods in Eureka, California, is using Calculator-Based Laboratory units which allow students to better relate physics concepts to their everyday lives.

- At the Community College of Finger Lakes in New York, computer laboratories are being used to integrate real-world interdisciplinary activities into targeted mathematics and science courses. This project helps students to recognize problem solving scenarios in their own lives, gives students the opportunity to solve problems using multiple disciplinary approaches, and makes students more comfortable using technology to take and interpret data. A similar project integrates calculators into the mathematics classroom in a consortium of two-year schools in Kentucky, Florida, and Georgia.

- Students in a Chemical Technology Program at Brazosport College in Lake Jackson, Texas are being provided with innovative experiences in analytical techniques which make extensive use of computerized controlled lab processes. These training opportunities are particularly useful to students who are interested in, or employed in, the local petrochemical industry.

- At Trident Technical College in Charleston, South Carolina, students are learning to use a robotic system to synthesize conventional welding theory and skills training with automated applications. Students undertake a project in which they collaborate in manufacturing teams to develop and manufacture a product.

- An award to Walters State Community College, Morristown, Tennessee creates a Mathematics Computer Laboratory. Through this project a networked computer lab dedicated to college level mathematics courses is being established. The computers have enabled students to explore functional behavior, visualize, and program numerical techniques. Using the computer laboratory, any student may surf the Internet or use personal e-mail. A new course, Math for Elementary Teachers, will be taught for pre-service teachers. The lab will also be used for Internet training of middle and high school mathematics teachers in a one day workshop funded by the Eisenhower Regional Consortium for Mathematics and Science Education.

The Leadership in Laboratory Development projects (ILI-LLD) portion of the program supports the intellectual effort needed to develop national models for undergraduate laboratory instruction. The ILI-LLD supports project costs beyond equipment. For example, Harrisburg Community College is developing an interdisciplinary quantitative and scientific reasoning course, along with a textbook and other accompanying instructional materials. In this laboratory oriented course, students analyze data that they themselves collect to determine both the scientific principles it illustrates and the properties of the types of functions it represents.

Table 9

ILI Funding to Two-Year Institutions by Discipline: FY 1996

Discipline	# of Awards	Dollars (in thousands)
Chemistry	18	372
Computer Science	1	58
Engineering	10	534
Geosciences	1	77
Interdisciplinary	2	85
Life Sciences	10	366
Mathematics	9	431
Physics	8	167
Social Sciences	1	30
Total for Instrumentation Projects	**60**	**$2,120**
Leadership in Laboratory Development		
Mathematics	1	86
Total for Program	**61**	**$2,206**

Table 10

ILI Proposal Activity By Type of Institution

FY 1993 - FY 1996

	FY 1993			FY 1994			FY 1995			FY 1996		
	# Proposals	# Awards	Funding Rate	# Proposals	# Awards	Funding Rate	# Proposals	# Awards	Funding Rate	#Proposals	#Awards	Funding Rate
Doctoral Institution	970	170	17%	666	164	25%	629	145	23%	552	175	32%
Four-Year Institution	1022	337	33%	907	334	37%	839	294	35%	850	264	31%
Two-Year Institution	204	63	31%	200	59	30%	178	57	32%	190	61	33%
Totals	2196	570	26%	1773	557	31%	1646	496	30%	1592	500	31%

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Undergraduate Faculty Enhancement (UFE)

The Undergraduate Faculty Enhancement (UFE) program supports projects that enable faculty members who teach undergraduate courses to gain experience with recent advances and new experimental techniques in their fields and learn new ways to incorporate these into undergraduate instruction. Projects are regional or national in scope and typically consist of hands-on workshops or short courses, along with follow-up activities. For example, the Mathematical Association of America is sponsoring a series of national workshops designed for mathematicians who teach statistics. Workshops goals include increasing emphasis on data and concepts, cultivating statistical thinking, and fostering active learning through alternatives to lecturing. The co-principal investigator is from Austin Community College and the principal investigator is from Mount Holyoke College.

UFE workshops are often held on two-year campuses as well as four-year college and university campuses to encourage collaboration of faculty from many types of institutions. From 1996, examples include:

- A workshop for dissemination of the calculus reform projects organized by the Mathematical Association of America and Macalester College was held at Houston Community College.

- A continuing set of workshops led by principal investigators from Joliet Junior College, Joliet , Illinois and Lee College, in Baytown, Texas has introduced several hundred two-year college physics teachers to innovative ideas in pedagogy and best practices developed with a strong physics education research base. A second round of workshops held at two-year colleges across the nation, has helped to develop a national network of two-year college physics teachers and will result in several written products based on local curriculum reform efforts which are being collected and edited into a single book.

A major component of UFE is regional coalitions of two- and four-year colleges and universities. FY 1996 represents the fifth year of the initiative to encourage such coalitions. The coalitions include activities to help faculty learn about new advances in their disciplines and to incorporate these developments into the curriculum. Continuing activities are very important to ensure interaction among coalition members. For that reason, coalitions are usually funded for a period of two to three years. These include coalitions of two-year institutions, coalitions of two- and four-year institutions, or projects at four-year institutions primarily for two-year faculty. For example:

- Truckee Meadows Community College and the University of Nevada Reno are introducing undergraduate college faculty in Nevada to the reform of business calculus using materials developed by the NSF Harvard Calculus Consortium.

- New Hampshire Technical College is leading a consortium of two- and four-year colleges and universities in New England in the exploration of how physics lessons can be developed and shared over the World Wide Web. Physics students from across New England access the Web to explore problem sets, view digitized images, share data in joint experiments, and take part in many other activities that foster interaction between physics learning communities.

Community college faculty also attend many of the other workshops supported by the UFE program. Table 11 estimates the number of faculty who attended faculty enhancement workshops.

Table 11

INSTITUTIONAL AFFILIATION OF PARTICIPANTS IN UFE-SUPPORTED WORKSHOPS FY 1993 - FY 1996

	FY 1993 66% Reporting		FY 1994 94% Reporting		FY 1995 92% Reporting		FY 1996 95% Reporting	
Colleges	**Number**	**% Total**	**Number**	**% Total**	**Number**	**% Total**	**Number**	**% Total**
Two-Year	427	24%	698	32%	703	29%	598	23%
Four-Year	547	30%	623	29%	717	30%	1500	59%
Universities	859	46%	829	39%	969	41%	450	18%
TOTAL	1833		2150		2389		2548	

Course and Curriculum Development (CCD)

The Course and Curriculum Development program supports projects to improve the quality of courses and curricula in science, mathematics, engineering, and technology. It encompasses activities affecting the learning environment, content, and experience of instruction. This component seeks projects that envision major changes with potential national impact that result in widely disseminated products such as textbooks, software, and teaching materials. For example, The State University of New York (SUNY) is setting up the "Beta Coalition," a regional collaboration between two- and four-year institutions in the state of New York. The goal is to adapt best practices from the NSF Engineering Education Coalitions to make them compatible with the resources available at two-year and smaller four-year colleges. The focus will be on multi-disciplinary, integrated courses in the freshman and sophomore years. SUNY Binghamton and Broome Community College will lead the effort which combines faculty workshops with curriculum "adapt and adopt" implementations.

The CCD initiative on **Institution-Wide Reform (IR)** of Undergraduate Education in Science, Mathematics, Engineering, and Technology supports projects to stimulate reform of SMET education for all students and to provide national models of excellence. It is intended that visionary, comprehensive plans based on successful and significant accomplishments will catalyze modifications in the institutional culture and infrastructure that are prerequisite to systemic reform. Awards are intended to motivate changes in priorities and the allocation of resources so that institutions may produce self-supporting reform initiatives. Working as partners, faculty, students, and administrators at institutions are striving to prepare literate citizens; outstanding scientists, mathematicians, engineers, and technicians; a technically sophisticated workforce; and enthusiastic and creative teachers well grounded in content and pedagogy. In the first year of operation, community and other associate degree granting institutions received six of the 23 awards. In Illinois, Oakton Community College faculty and administrators are developing a team approach to examine, revise, identify, and develop objectives, resources, activities, teaching strategies, and assessment tools for core courses in chemistry, biology, and

mathematics. The Community College of Philadelphia is implementing a new undergraduate curriculum entitled *Culture, Science, and Technology*. To implement this curriculum, a group of faculty are identifying common themes, curricular materials, and pedagogical methods that enhance students' understanding of the interactive and complex relationship between culture and technology. Wake Technical College in North Carolina is expanding its integrated curriculum and capstone project currently required in three engineering technology programs to 27 technology programs. Using a team approach, mathematics, engineering technology, science, and communications are linked for students early in their college education. Later, students working in interdisciplinary teams complete and present an applications-oriented capstone project.

While the calculus program has been phased out as a separate entity, several two-year colleges have funding in FY 1996 to complete their projects. The purpose of the **Calculus Program** was to foster improvement in the quality of calculus instruction on the national level. Supported projects include large-scale calculus revision programs, implementation at large institutions or by consortia of institutions, new calculus development projects, and preparation for calculus projects. For example, a consortium of two- and four-year institutions in the State of Washington continues to disseminate and adapt, as well as evaluate, the use of both the Duke and Harvard materials throughout the state. North Harris, San Jacinto Central, and Tomball Community Colleges are partnering with Sam Houston State University to create a network of 28 community colleges and comprehensive universities to reform their calculus curriculum. Colleges are using student activities and customized instructional methods from other calculus reform efforts. The methods integrate cooperative learning, graphing technology, and writing. Workshops are being conducted to involve other institutions outside the consortium and additional faculty members within the consortium. Many community colleges are being affected by other calculus reform efforts. SUNY Suffolk Community College is part of the Harvard Calculus Consortium. In addition, many two-year colleges have adopted the reform calculus texts supported through the NSF Calculus Program.

Division of Elementary, Secondary, and Informal Education (ESIE)

The Division of Elementary, Secondary, and Informal Education (ESIE) supports programs designed to improve the educational experiences of all students in school settings and to increase and improve the opportunities for all individuals to explore science, mathematics, and technology beyond the school setting. The Division achieves these goals by supporting projects to develop and implement high-quality instructional materials and assessments; enhance the mathematical, scientific, pedagogical, and technological knowledge of teachers and create a cadre of teacher change-agents; and to provide stimulating environments outside of school to increase the understanding and appreciation of science and mathematics and their applications by individuals of all ages.

The ESIE Division directly supported two-year colleges in FY 1996 through the following programs:

- **Advanced Technological Education (ATE)** for the development of courses, curricula, and faculty and teacher development to improve the quality of the education for science and engineering technicians.
- **Teacher Enhancement (TE)** for professional development programs that lead to a new level of teacher competence and a supportive school culture that empowers teachers to engage all students in science, mathematics, and technology education.
- **Young Scholars (YS)** to excite students in grades 7 - 12 about science, mathematics, and technology and to encourage them to investigate and pursue careers in these fields.

- **Local Systemic Change (LSC) Projects Through Teacher Enhancement Grades K - 8** for school systems with their partners to initiate efforts that will result in K - 8 teachers making significant progress towards reaching national goals for the teaching of mathematics and science education.
- **Local Systemic Change** in **Mathematics (LSCM) Through Teacher Enhancement in Grades 7 - 12** to initiate systemic efforts that will result in grades 7 - 12 teachers making significant progress towards reaching national goals for the teaching of mathematics.

Table 12 shows ESIE support to Two-Year colleges by program.

Table 12

DIVISION OF ELEMENTARY, SECONDARY, AND INFORMAL EDUCATION (ESIE)
FY 1994-FY 1996 GRANTS TO TWO-YEAR COLLEGES BY PROGRAM
(DOLLARS IN 1000s)

Program	# Awards	FY 1994	# Awards	FY 1995	# Awards	FY 1996
TE	6	$1,058	3	$1,475	3	$892
YS	8	430	9	430	3	204
ATE	13	4,479	21	6,970	21	7,767
LSC	-	-	-	-	1	903
LSCM	-	-	-	-	1	382
Totals	**27**	**$5,967**	**33**	**$8,875**	**29**	**$10,148**
Estimated Outyear Totals		$13,000		$17,000		$18,000

Teacher Enhancement (TE)

All teachers must continue professional development and renew career commitments. Well-prepared teachers need to engage in activities that enrich and strengthen their teaching; to influence and improve the teaching of their colleagues; and to be recognized for their efforts. Teacher Enhancement (TE) supports development of effective approaches and creative materials for the continuing education of elementary, middle, and secondary teachers of science, mathematics, and technology. Successful projects emphasize both content and pedagogy, help teachers develop and exercise leadership qualities, and provide opportunities for continuing professional growth and interaction. Projects typically involve

intensive summer workshops followed by activities during the academic year. For example, the two-year campus of Miami University at Middletown is cultivating district systemic implementation of physical science education. Teams of teachers and administrators participate in summer workshops which include working directly with students. Academic year follow-up includes fall and spring sessions where participants report on activities and exchange information.

Young Scholars (YS)

Commitment and preparation for careers in science, mathematics, engineering, and technology, or education in these fields begin during secondary school years. The Young Scholars (YS) Program, which targeted high-potential and high-ability youth in grades 7 - 12, was designed to inform and excite students about these disciplines and to encourage them to investigate careers in these fields. The YS program strongly emphasized student participation in the process of scientific discovery through interaction with practicing scientists and science educators both in the laboratory and in the field. Projects offered a combination of instruction, research, and problem-solving activities along with a discussion of career preparation and science ethics. For example, Atlanta Metropolitan College's Young Scholar project in chemistry and mathematics for students in grades 7 and 8 included classroom discussions, laboratories, and field experiences stemming from the investigation of the chemistry of the environment.

(The Young Scholars Program has been replaced by the Teachers and Student Development Through Research Experiences program.)

Local Systemic Change Project K - 8 (LSC) and Local Systemic Change Mathematics 7 - 12 (LSCM)

The Local Systemic Change (LSC) Projects Through Teacher Enhancement Grades K - 8 allows school systems with their partners to initiate efforts that will result in K - 8 teachers making significant progress towards reaching national goals for the teaching of mathematics, science, and technology education. Projects which align policy and practice include (a) a shared vision of science, mathematics, and technology education, which includes goals and objectives for student learning, and incorporates national and state standards for curriculum, teaching practice, and assessment; (b) active partnerships and commitments among stakeholders; (c) a detailed self-study that provides a realistic assessment of the current system's strengths and needs; (d) strategic planning that incorporates mechanisms for engaging each teacher in intensive professional development activities; and (e) a set of clearly defined, measurable objectives and an evaluation plan that provides on-going feedback for the project.

The **Local Systemic Change Through Teacher Enhancement in Mathematics Grades 7 – 12 (LSCM)** is designed to initiate systemic efforts that will result in grades 7 - 12 teachers making significant progress towards reaching national goals for the teaching of mathematics. For example, the Maricopa Community College District is implementing the Interactive Mathematics Program (IMP) through the use of seven integrated components: in-service enhancement on the mathematics and pedagogy of IMP; follow-up support activities, internal capacity for professional development; school teams for support of teachers; teachers from schools considering IMP; articulation with feeder schools; and impact on pre-service teacher training. The project led by Maricopa involves mathematics teachers in grades 9 - 12, Arizona State University, and the Intel Corporation.

Division of Human Resource Development (HRD)

The programs in the Division of Human Resource Development (HRD) reflect the Foundation's commitment to developing the resources of the scientific and technical community as a whole. The Division has primary responsibility for broadening participation of individuals from groups underrepresented in science, mathematics, engineering, and technology (SMET). The Division operates and coordinates a range of programs that focus on increasing the presence of minorities, women and girls, and persons with disabilities in SMET.

Alliances for Minority Participation (AMP)

The Alliances for Minority Participation (AMP) program is a comprehensive and multidisciplinary undergraduate program designed to increase significantly both the quality and the number of baccalaureate degrees in SMET disciplines earned by groups who are underrepresented in these fields.

The AMP projects administered through cooperative agreements in partnership with NSF contain each alliance's goal (the current number of minorities obtaining BS degrees in SMET and the alliance's five year goal) and specific work statements that describe how the alliance will achieve its goal. Institutions participating in AMP are committed to better serve all SMET students today and to institutionalize changes that will ensure that all students have access to quality SMET educational opportunities.

Alliances establish partnerships among community and other two-year colleges, four-year colleges and universities, school systems, other government agencies, major National SMET laboratories and Centers, industry, private foundations, and SMET professional organizations as necessary to achieve AMP objectives. Two-year colleges are involved in virtually every AMP project in significant ways.

For example, the Philadelphia Alliance includes seven diverse four-year colleges and universities and the Community College of Philadelphia. A critical component of the Alliance's developing strategy on articulation is that support for student transfer must transcend simple articulation agreements. The support systems of the community college and the four-year receiving institution are being integrated so as to make the transition truly seamless from the student's point of view. A new strategy which is being implemented allows students to make the transition gradually through concurrent enrollment. Most significantly, the Alliance's concurrent enrollment programs are structured, rather than simply allowing community college students to "sample" courses at four-year institutions.

Another example is the New York City Alliance, a coalition of 16 colleges within the City University of New York (CUNY) which share a five-year goal of doubling the number of underrepresented minority students earning BA degrees in science, mathematics, engineering, and technology. The project is leading a change in the teaching of mathematics and science, especially at the introductory level. The new approach emphasizes problem-solving and collaborative learning. Alliance initiatives are improving the articulation between community and senior colleges. The coalition includes seven community colleges, eight senior colleges, and one technical college. One of the four project directors is from Bronx Community College.

Eighteen campuses of the California State University (CSU) system are each paired with a feeder two-year college member of the state community college system. One focus of the alliance is a sequence of supplemental workshops to which a group of minority students are asked to make a commitment. In the

summer before their freshman year students take a four-week summer workshop focusing on entry-level mathematics courses followed by a year long workshop which parallels and supplements the students' freshman year courses in mathematics. In the second year, students attend another four-week summer workshop which focuses on physics, chemistry, or biology combined with appropriate mathematics. The second workshop is followed by a year long workshop focusing on science. All workshops are located on one of the CSU campuses, but academic year activities take place at both the CSU campuses and the community college locations.

Texas A&M leads the Texas AMP. This alliance helps remove obstructions that minority students face at four year institutions and creates a pipeline between community colleges and four-year institutions. Active and lead AMP institutions include five four-year institutions and many community colleges. Two activities which specifically promote the pipeline between community colleges and four-year institutions are the Trans-Texas Videoconference Network and the Office of Transfer and Articulations. In addition, two-year college students are recruited for industry internships.

Alliance for the American Indians has developed and implemented innovative programs with input from both the Indian community and the SMET community to enhance matriculation of the American Indians at three critical transition points, two of which involve community colleges: (1) high school to tribal, community and four-year college, (2) tribal, and community two-year college to four-year, and (3) four-year institutions to doctoral-granting programs in SMET fields. The two lead institutions are Salish Kootenai College (SKC), a tribal college, and Montana State University, a SMET baccalaureate and doctoral degree granting institution.

By the end of the 1997 spring semester, students who started as first year students in the eleven AMPs in 1992 and 1993 will be completing their fourth year of study.

Other HRD Support

In addition to the AMP program, HRD directly supported two-year colleges through the **Model Institutions for Excellence**, **Model Projects for Women and Girls**, **Model Projects for Persons with Disabilities,** and **Comprehensive Partnerships for Mathematics and Science Achievement**.

The **Model Institutions for Excellence** (MIE) initiative offers an opportunity for Oyate Tribal colleges and their 26 tribal counterparts to reach underrepresented American Indian students and to bring academic and technical expertise to tribal nations in ways that may make the difference between extinction and tribal self-sufficiency. In this program, Cheyenne River, Standing Rock, and Sisseton Wahpeton Community Colleges are joining with Oglala Lakota College and Sinte Gleska University to develop programs in environmental science and software engineering.

The EHR **Model Projects for Women and Girls** seeks to encourage the design and implementation of innovative, short term, and highly focused activities, strategies, and materials to improve educational achievement and to encourage entry and improvement of women and girls into SMET fields. For example, Maricopa Community College is focusing on activities that increase students', faculty, and counselors' understanding of the relationships between gender and the study of science. The project is increasing the completion success rate of female community college students enrolled in science courses, developing new instructional approaches to better prepare females for upper division study and careers involving scientific research, and increasing the number of female students enrolled in science courses by helping them make informed career choices and better course selection decisions. Miami-Dade Community College is involving teams of mathematics and English faculty to determine how writing used to develop, construct, and express mathematical understanding affects female achievement in, and attitude towards, their college and middle school mathematics classes. This, along with mentoring and

career counseling, is helping middle and community college females become more interested in mathematics and science careers.

The **Model Projects for Persons with Disabilities** promotes the development and dissemination of innovative intervention strategies that reduce the barriers that inhibit the interest, retention, and advancement of students with disabilities in science, engineering, and mathematics education and career tracks. For example, Linn-Benton Community College in Oregon is developing an interface needed to optimize the use of ASTER and related audio-formatting programs for students with learning disabilities. The innovative computer program, ASTER, initially developed to present mathematics equations in an audio format for students with visual disabilities is now being tested for students with other learning disabilities.

The **Comprehensive Partnerships for Mathematics and Science Achievement (CPMSA)** forges alliances for systemic reform. This program supports school systems with significant minority populations to create partnerships that improve access to science and mathematics education for minority students in grades pre-K through 12. For example, Prince George's Community College in Maryland is cooperating with the Board of Education of Prince George's County to provide direct services to the community. The program *Communities Committed to Children* allows 20 school communities and clusters to take ownership of thousands of students enrolled in a feeder pattern involving elementary, middle, and high school as well as the community college. Parents and school improvement teams serve as part of the decision-making process.

Division of Research, Evaluation, and Communication (REC)

The **Division of Research, Evaluation, and Communication (REC)** supported two-year colleges through the **Networking Infrastructure for Education (NIE)** program and the **Studies and Indicators** program. Two-year programs continued to receive support in FY 1996 from the following programs although there have been substantial changes to the programs themselves.

Networking Infrastructure for Education (NIE)

The **Networking Infrastructure for Education** (NIE) Program was designed to build synergy among technology and education researchers. The NIE program was a joint effort between the Directorates for Computer and Information Science and Engineering (CISE) and Education and Human Resources (EHR). The aims of the NIE Program were to expedite the development of a widespread high performance electronic communications infrastructure in support of science, mathematics, engineering, and technology (SMET) education reform, and to lay a foundation on which strategies for the appropriate use of technology in support of increased student achievement could be developed. The NIE awards built synergy between technology and education researchers, developers, and implementers to explore networking costs and benefits, tested self-sustaining strategies, and developed models of a flexible educational networking infrastructure to speed the pace of educational innovation and reform.

The NIE Program supported projects in the areas of: (a) programmatic evaluation of the impact of existing technology programs on the infrastructure of education, and on systemic reform; (b) widespread dissemination to appropriate audiences of the outcomes of existing models both successful and unsuccessful; and (c) electronic library implementation prototypes. Many projects funded by NIE included collaborations of groups interested in mathematics and science education. Two-year colleges were often represented on such teams and participated through advisory committees and dissemination

and outreach activities. For example, the New Jersey NIE project worked with community colleges in collaboration with the NJ Statewide Systemic Initiative. The University of Hawaii trained faculty from community colleges. They provided the mechanisms through which community colleges worked with K - 12 faculty to articulate common educational goals and concerns.

In several projects, two-year colleges were the lead institutions. For example, NIE provided support for the initial implementation phases of the Navajo Learning Network (NLN) based at Navajo Community College (NCC), a four-part project with the overall objective of establishing a single virtual campus linking all educational institutions within the Navajo Nation. Teaching, research, and curriculum development activities were carried out collaboratively by K - 12 as well as NCC faculty and students. A base level of connectivity between participating institutions was accomplished utilizing the wide-area network developed by the Navajo Nation government that connected participating Navajo Nation K - 12 schools to Navajo Community College's system and out to the Internet. The NLN project team, together with trainers from the Los Alamos National Laboratory, provided training both on NLN and Internet access, and worked closely with NCC and K - 12 faculty to develop effective strategies for utilizing information technology as a teaching and learning tool in a way that is sensitive to the learning styles prevalent among Navajo schoolchildren. The planned information technology upgrade was necessary to provide expanded education and support services to the entire NCC campus system, and ultimately to all residents of the Navajo Nation, an area of approximately the size of West Virginia (25,000 square miles), covering portions of Arizona, New Mexico and Utah. Currently, over 200,000 Navajos live on or near the reservation.

Studies and Indicators (SI)

The **Studies and Indicators** program, now a part of the Research on Education, Policy, and Practices (REPP) program, sponsored research on significant factors, trends, and practices that assist the Foundation and other agencies and organizations to strengthen science, mathematics, engineering, and technology education. Priorities focused on five broad policy areas: (a) participation in science, (b) teacher supply and qualifications, (c) instructional and school practices, (d) educational reform, and (e) the role of science and mathematics skills in the workforce. For example, Indian River Community College in Florida identified sets of core competencies and skills in mathematics, science, engineering, and technology that are required by industries that hire two-year college graduates with technical degrees. The project investigated five technology based industries, interviewed technicians and their supervisors, and produced research papers on the integration of the community college curriculum with industrial needs.

Division of Educational System Reform (ESR)

The **Division of Educational System Reform (ESR)** supports the statewide, urban, and rural systemic initiatives. Community colleges are involved, as appropriate, in numerous state and urban systemic initiatives; the focus of these programs is to improve science, mathematics, engineering, and technology education for grades pre-K through 12. The Rural Systemic Initiatives (RSI) involve community colleges in substantive ways.

Rural Systemic Initiatives (RSI)

The goal of the **Rural Systemic Initiatives** in Science, Mathematics, and Technology Education Program (RSI) is to promote systemic improvements in science, mathematics, and technology education for students in rural, economically disadvantaged regions of the nation and to ensure sustainability of these improvements by encouraging community development in conjunction with instructional and policy reform. In addition, programs should help prepare a technologically competent workforce to enhance the infrastructure of economic development activities within a community or region by strengthening the science, mathematics, engineering, and technology instructional capacities of regional colleges and universities, particularly community and technical colleges responsible for technician education. Programs also strengthen other lower division instruction of technical curricula and entry-level science and mathematics curricula of the future teaching workforce. These collaborations extend across K - 12 school systems and into institutions of higher education. Each of the RSI projects includes participation of two-year colleges and other institutions which award associate degrees.

The RSI program continued four development awards and two planning grants began in FY 1994 and four implementation phase grants began in FY 1995.

The collaboratives which include two year college representation are geographically and intellectually related networks established to address local challenges, goals, and commitments. The collaboratives are located at regional institutions of higher education, and serve as conduits of information and expertise between the students and the outside world. For example:

- The ***High Plains Rural Systemic Initiative (HPRSI)*** brings together 17 American Indian tribal colleges and other entities involved in science, mathematics, engineering, and technical education in Montana, Nebraska, North Dakota, South Dakota, and Wyoming. The initial implementation activities began at colleges that serve six reservation areas. These locations have Internet access, interactive video, and up-down link satellite transmission. HPRSI directs capacity building at the other colleges, and has implementation activities instituted at all 17 sites. This initiative is seeking to identify and coordinate efforts to remove impediments for exemplary student performance in SMET education among American Indians.

- The ***Appalachian Rural Systemic Initiative (ARSI)*** is a collaborative implementation initiative among six states (Kentucky, North Carolina, Ohio, Tennessee, Virginia, and West Virginia) comprising the central Appalachian region. ARSI facilitates site-based management and educational systemic reform by establishing "Resource Collaboratives." The coalition is directing, facilitating, and organizing a series of activities designed to determine needs and strategies for systemic educational reform in a geographically challenged and economically depressed area.

CHAPTER V
RESEARCH DIRECTORATES

NSFNET and Network Infrastructure Program

Projects continuing in FY 1996, which were implemented under previous programs, no longer available, include the NSFNET and the Network Infrastructure Program which encourage and facilitate scholarly communication and collaboration by providing data network access to researchers and educators, supercomputer Centers, and information resources. These programs support expansion, operation, and use of the NSFNET backbone service and assist mid-level networks, and support network connections from institutions of higher education to mid-level networks. In FY 1996, NSFNET and the Network Infrastructure Program supported direct Internet access for 15 two-year colleges. Other two-year colleges were supported through larger grants which help a consortia of institutions gain access to Internet capabilities.

For example, through the **NSFNET** program, Green River Community College in Washington is connecting to the Internet to allow their faculty and students to benefit from access to Internet resources, including libraries and supercomputers. They are also able to communicate and collaborate with colleagues at other institutions in pursuit of research and educational projects. Valencia Community College in Florida is utilizing its award to permit six campuses access to the Internet for accessing information throughout the system, state, and nation. The Illinois Eastern Community College District is connecting four rural community colleges and one museum to the Internet.

The two-year Bayamon campus of the American University Puerto Rico is being supported through the **Network Infrastructure** program. Bayamon is developing a test station for the synchronization characterization of telecommunications networks, to develop the software for the generation of test signals and for the user interface, and to research better synchronization in synchronous optional networks.

Technology Reinvestment Project (TRP)

The mission of the Technology Reinvestment Project (TRP), now transitioned to the Joint Dual-Use and Dual-Use Applications Programs under the Department of Defense Advanced Research Programs Agency (DARPA), is to stimulate the transition to a growing, integrated national industrial capability that provides the most advanced, affordable military systems and the most competitive commercial products. While the TRP program did not make any new awards in FY 1996, numerous two-year colleges are still being supported through the program either by continuing awards made directly to them or through consortia arrangements.

The TRP competition included a Manufacturing Education and Training Program to establish programs for the retraining of active and displaced defense workers and improvement of the manufacturing curricula in U.S. colleges and universities. Manufacturing covers a wide range of technologies and concepts, and encompasses the full spectrum of materials, products and processes upon which the American industrial enterprise is based. In the context of the Manufacturing Education and Training (MET) competition, manufacturing encompasses the full range of economic activities from chemical and

biotechnology processing to electronic component and system fabrication, durable goods production, fabrication of structures, and other manufacturing sectors. Activities in the MET area focus on upgrading individual skills with the aim of producing a world-class, flexible manufacturing workforce that will function effectively under both defense and commercial production regimes. They also focus on providing the highly skilled, flexible technical workforce of the future. Activities target the improvement of curriculum and educational tools at universities, two- and four-year colleges, technical and vocational schools, and pre-college educational institutions, and emphasize partnerships among these educational institutions. Activities place special emphasis on skill conversion for engineers, technicians and other professionals displaced by the defense draw-down.

Six two-year institutions were directly supported by TRP/MET awards. Five additional awards have two-year college co-principal investigators and significantly involve two-year colleges in project activities. Most of these awards continue to be supported in FY 1996. For example, Drexel University, Camden County College, Delaware Community College, and the Community College of Philadelphia are creating a program to retrain displaced defense industry personnel. Industry involvement includes participation on advisory boards, curriculum development, and adjunct teaching. Erie County Technical Institute, expanded under the TRP to the Northwest Pennsylvania Technical Institute, is leading a consortium of 30 colleges and universities in cooperation with eight metal products and tool and die firms to develop courses for workers in two- and four-year degree programs in manufacturing.

Engineering Education Coalitions (EEC)

The Engineering Education Coalitions program was developed to stimulate bold, innovative, and comprehensive models for systemic reform of undergraduate engineering education. The purpose of the program is to link universities and colleges of differing character to collaborate in experiments and to implement reforms, acting as change agents for the engineering education community at large.

The need for reform arises from the evolution of engineering education and research on American campuses in the last century and from the pressures for change in the role of engineering in industry and academe as we enter the 21st century. Academic engineering programs experienced a significant redirection after World War II, when the need arose to link engineering more closely to its scientific roots in order to strengthen the scientific underpinnings of the engineering disciplines. It became important for engineers to be able to solve problems analytically and work independently in the disciplinary scientific mode. It has become increasingly apparent that engineers also require, not only disciplinary depth, but also strong integrative qualities if they are to participate fully in leading innovation in the next century. Thus was the impetus for development of the Engineering Coalitions program.

There are eight Engineering Coalitions representing more than 50 academic institutions. These Coalitions comprise a nationwide network that emphasizes a synergistic approach to engineering education reform. All coalitions share the common goals of designing and implementing comprehensive, systemic models for structural reform of undergraduate engineering education; providing tested alternative educational tools, curricula and delivery systems to accomplish this reform; increasing the successful participation of women and underrepresented minorities in engineering education and improving linkages to pre-college and community college educational institutions; and creating

significant intellectual exchange and resource linkages among engineering baccalaureate-producing institutions. Publication NSF 95-62, *Engineering Education Coalitions (EEC) Fact Sheets*, provides additional information about the Engineering Coalitions.

Several of the Engineering Coalitions have two-year colleges as formal members. For example Maricopa Community College District, which serves the greater Phoenix, AZ area, is a member of the Foundation Engineering Education Coalition. Maricopa has been working with other coalition institutions, especially Arizona State University, to develop freshman design courses along the model of other Foundation institutions. The College of Technology, a virtual college of the Connecticut Community and Technical Colleges, is a member of another EEC Engineering Academy of Southern New England. Primary participation has been through articulation arrangements with the School of Engineering at the University of Connecticut.

In addition to these formal memberships, other coalitions are involving community colleges in their activities. For example, the Engineering Coalition of Schools for Excellence in Education and Leadership (ECSEL) has had long-standing arrangements to transport freshman design courses to community colleges in the locales of member institutions such as the University of Washington, University of Maryland and Morgan State University. The Synthesis EEC Coalition has developed relationships aimed at introducing Synthesis-developed courses to the two-year institutions. The Gateway Coalition has invited two-year colleges to serve as beta test sites for Gateway-developed courses.

Other Selected Examples

The **Research Experiences for Undergraduates** program is supported by all the Foundation's disciplinary research programs. It provides opportunities for undergraduate students to experience hands-on participation in research or related scholarly activities in areas of science, mathematics, and engineering. Through the Directorate for Biological Sciences, with partial support from the ATE program in DUE, Massachusetts Bay Community College is developing an innovative summer program which targets students from two-year colleges. During the first two summers, students are being extensively trained in various techniques used in molecular biology and biotechnology research. During the third summer participants will use this technical knowledge to pursue independent research at the Marine Biological Laboratory in Woods Hole. This research institute is designed to provide students preparation both for graduate school and the workplace.

Several programs in the Directorate for Biological Sciences support faculty research in two-year colleges. The **Microbial Genetics** program focuses on genetic inquires using investigations of microbial interactions with other organisms. Faculty at Allegany Community College in Maryland are studying the general utility of insertional mutagenesis using inducible Ty elements in budding yeast. The **Ecology** program supports community ecology and population interactions in such areas as (a) dynamics and processes within specific communities or habitats, (b) food-web structure and landscape patterns, and (c) organismal interactions. Faculty at the two-year Miami University campus at Hamilton in Ohio are investigating the effect of tillage practices in soybean fields on the survival and existence of two species of wolf spiders. The **Instrumentation and Development** Program supports research in Multiuser Equipment and Instrumentation Resources and Instrumentation Development for Biological Research. Brevard Community College in Florida acquired a dual channel autoanalyzer to perform automated nutrient analysis which is used to analyze water quality conditions with the Indian River Lagoon ecosystem. The college, through the Brevard Teaching and Research Laboratories, operates as a joint use facility and all instrumentation is available to the entire regional research community.

Other research directorates support two-year colleges in limited ways. The **Applied Mathematics Program** is supporting a researcher at the University of Wisconsin Richland campus to make a careful mathematical analysis of the theory of solar coronal heating. The **Neuroengineering** program supports faculty at Honolulu Community College to study learning models in noisy and changing environments.

APPENDIX I

INDEX OF AWARDS
FY 1996 AWARDS TO TWO-YEAR COLLEGES
BY STATE

Two-Year College Principal Investigator or Co-Principal Investigator

The awards in this section are ordered alphabetically by state, then by Division, by Program within the Division that made the award, and lastly, by proposal number. The list does not include the special grants made to two-year colleges for IPA positions. The co-principal investigators are only listed when the grant was made to four-year colleges and universities other than in the ATE program. The section only lists grants where FY 1996 monies went to the institutions. Many two-year colleges continue to be supported in FY 1996 through multiple year standard grants where all the funds were committed in years FY 1993-FY 1995.

Key:

BES = Division Bioengineering and Environmental Systems
BIR = Biological Instrumentation and Resources
CISE = Directorate for Computer and Information Science and Engineering
CDA = Cross-Disciplinary Activities
CHE = Division of Chemistry
DBI = Division of Biological Infrastructure
DEB = Division of Environmental Biology
DMS = Division of Mathematical Sciences
DUE = Division of Undergraduate Education
ECS = Division of Electrical and Communications Systems
EHR = Directorate for Education and Human Resources
ESI = Division of Elementary, Secondary, and Informal Education
ESR = Division of Educational System Reform
HRD = Division of Human Resource Development
MCB = Division of Molecular & Cellular Biosciences
NCR = Division of Networking & Communications Research and Infrastructure
REC = Division of Research, Evaluation, and Communication
REU = Research Experiences for Undergraduates
SBER = Division of Social, Behavioral & Economic Research

The awards appear in the following format:

STATE

Project Title
PI: Principal Investigator — NSF Program under which the proposal was submitted
Awardee Institution — Division-Proposal #
Street Address — FY 1996 Dollars (Total Award Amount)
City, State, Zip Code — Major Discipline
PI email address
CoPI: Co-Principal Investigator

The abstracts of the awards listed here can be obtained by accessing the NSF Home Page at **http://www.nsf.gov**.

BEST COPY AVAILABLE

ALASKA

Rural Alaskan Environmental Education Program
PI: John Carnegie
University of Alaska Southeast Juneau Campus
11120 Glacier Highway
Juneau, AK 99801-8625

Advanced Technological Education
DUE-9553680
FY 1996 $250,000 ($600,000)
Environmental Technology

ARIZONA

CISE/EHR/ENG/MPS Collaborative Research on Learning Technologies: Community-based Learning Systems: Exploring Models in Use
PI: Jim Walters
Maricopa County Community College District
Tempe, AZ 85281-6941
Walters@pc2-pc.maricopa.edu

CISE Institutional Infrastructure
CDA-9616499
FY 1996 $298,698
Computer Science

CISE Minority Institutions Infrastructure: Computer Information Systems Programs for The Navajo Nation
PI: Katherine Larason
Navajo Community College
Tsail, AZ 86556
klarsonat@hou.lbl.gov

CISE Institutional Infrastructure
CDA-9633177
FY 1996 $50,000
Computer Science

Image Processing for Teaching: Faculty Development and Curriculum Materials
PI: Melanie Magisos
Center for Image Processing in Education
5343 E Pima Suite 201
Tucson, AZ 85712-3657
ipmagisos@aol.com

Advanced Technological Education
DUE-9454520
FY 1996 $476,524 ($1,361,831)
Computer and Information Technology

Teamed Internships: Innovative Education Program for Environmental Technicians and Engineers
PI: Gregory Ogden
Pima County Community College
8181 East Irvington R.
Tucson, AZ 85709-4000
gogden@east.pima.edu

Advanced Technological Education
DUE-9602368
FY 1996 $330,000
Biotechnology

Maricopa Advanced Technology Education Center
PI: Alfredo de los Santos
Maricopa County Community College District
2411 W 14th St
Tempe, AZ 85281-6941
delossantos@maricopa.edu

Advanced Technological Education
DUE-9602373
FY 1996 $892,878 ($2,704,046)
Electronics

MMATE 2000 Project - Maricopa Mathematics Advanced Technology Education 2000 Project
PI: Alan Jacobs
Maricopa County Community College District
2411 W 14th St
Tempe, AZ 85281-6941
jacobs@sc.maricopa.edu

Advanced Technological Education
DUE-9602386
FY 1996 $161,440 ($353,235)
Mathematics

AT-SLICE: Advanced Technologies and Simulations for Learning about Interactions in Complex Environments

PI: Jayshiro Tashiro
Northern Arizona University
Box 4132
Flagstaff, AZ 86011
tashiro@nauvax.ucc.nau.edu
CoPI: Steven Semken: Navajo Community College

Course & Curriculum Development
DUE-9555211
FY 1996 $448,947
Interdisciplinary

Phoenix Urban System Initiative (USI) Cognitively Guided Instruction Project

PI: Linda Jaslow Teacher Enhancement
Maricopa County Community College District
2411 W 14th St
Tempe, AZ 85281-6941
ljaslow@phoenixusi.usi.K - 12.az.us

ESI-9632604
FY 1996 $902,514
Mathematics

Changing The High School System: Implementing The Interactive Mathematics Program in Arizona (AZ IMP2)

PI: Linda Jaslow
Maricopa County Community College District
2411 W 14th St
Tempe, AZ 85281-6941
ljaslow@phoenixusi.usi.K - 12.az.us

Teacher Enhancement
ESI-9634034
FY 1996 $381,901 ($1,071,475)
Mathematics

Urban Systemic Initiatives in Science, Mathematics, and Technology Education (USI)

PI:Alfredo de los Santos
Maricopa County Community College District
Tempe, AZ 85281-6941
delossantos@maricopa.edu

Urban Systemic Initiative
ESR-9450652
FY 1996 $3,000,000 ($13,737,799)
Mathematics

EPWG: Women's Images of Science and Engineering

PI: Robin McCord
Chandler/Gilbert Community College Center
2626 East Pecos Road
Chandler, AZ 85225-2413
mccord@cgc.maricopa.edu

EHR Activities for Women & Girls in SEM
HRD-9555733
FY 1996 $147,285 ($508,981)
Interdisciplinary

The Navajo Learning Network Project

PI: David Basham
Navajo Community College
Tsail, AZ 86556
dbasham@aol.com

Networking Infrastructure for Education
REC-9554344
FY 1996 $191,012 ($640,994)
Interdisciplinary

CALIFORNIA

National Center for Environmental Transportation Technologies

PI: Dan Baxley
College of the Desert
43-500 Monterey Street
Palm Desert, CA 92260-9305
bax@ccd.cc.ca.us

Advanced Technological Education
DUE-9602448
FY 1996 $299,980
Engineering Technology

Preserving the Legacy: A Comprehensive Curriculum and Materials Development Project in Support of Advanced Environmental Technology Education

PI: Sally Beaty
Intelecom Intelligent Telecommunications
150 East Colorado Blvd, Suite 300
Pasadena, CA 91101-2437
intelecm@cerfnet.com

Advanced Technological Education
DUE-9454521
FY 1996 $499,989 ($1,499,966)
Environmental Technology

Pac-Tec: Pacific Technological Education Center

PI: Charlotte Behm
Mission College
3000 Mission College Blvd
Santa Clara, CA 95054-1804
cbehm@rio.com

Advanced Technological Education
DUE-9602345
FY 1996 $250,753 ($500,000)
Manufacturing

A GIS Core Curriculum for the 2-Year College

PI: Michael Goodchild
University of California-Santa Barbara
Department of Geography
Santa Barbara, CA 93106
good@geog.ucsb.edu

Advanced Technological Education
DUE-9602348
FY 1996 $188,469
Geographical Information System

The Faculty Associates in S&T Leadership Corps Project for Enhancing Environmental Technology Education

PI: Paul Dickinson
Partnership for Environmental Technology Education
6601 Owens Drive, Suite 235
Pleasanton, CA 94588

Advanced Technological Education
DUE-9602365
FY 1996 $300,000 ($600,000)
Environmental Technology

MATE - Marine Advanced Technology Education

PI: Nicole Crane
Monterey Peninsula College
980 Fremont Street
Monterey, CA 93940-4704
ncrane@earth.mpc.cc.ca.us
CoPI: David Warren: Cabrillo College

Advanced Technological Education
DUE-9602384
FY 1996 $74,841
Environmental Technology

Instrumentation for Undergraduate Biology and Biotechnology Training

PI: William Thieman
Ventura College
4667 Telegraph Road
Ventura, CA 93003-3872
bthieman@vcccd.cc.ca.us

Instrumentation & Laboratory Improvement
DUE-9650005
FY 1996 $25,000
Life Sciences

Atomic Absorption Spectroscopy as a Unifying Curricular Element

PI: Leverett Smith
Contra Costa Community College
2600 Mission Bell Drive
San Pablo, CA 94806-3166
lsmith@viking.dvc.edu

Instrumentation & Laboratory Improvement
DUE-9650043
FY 1996 $18,627
Chemistry

Advancement of Student Learning in Physiology-Anatomy Using Alternative Teaching Avenues and Enhanced Technology

PI: Zarir Marawala
Chabot College
25555 Hesperian Blvd
Hayward, CA 94545-2447

Instrumentation & Laboratory Improvement
DUE-9650527
FY 1996 $29,985
Life Sciences

The Discovery Approach to Chemistry Laboratory Experiments

PI: Jean Shankweiler
El Camino College
16007 Crenshaw Blvd
Torrance, CA 90506-0001
jmshank@aol.com

Instrumentation & Laboratory Improvement
DUE-9650666
FY 1996 $14,288
Chemistry

Facilitating Scientific Thinking in Undergraduate Biology Students with the Use of Computerized Data Acquistion

PI: Jenine Tanabe
Yuba College
2088 North Beale Road
Marysville, CA 95901-7605

Instrumentation & Laboratory Improvement
DUE-9650846
FY 1996 $32,354
Life Sciences

Incorporation of Modern Instrumentation to Improve the Chemistry Laboratory Curriculum

PI: Ted Yamada
Rancho Santiago Community College
17th at Bristol
Santa Ana, CA 92706

Instrumentation & Laboratory Improvement
DUE-9650951
FY 1996 $28,493
Chemistry

Palomar College Integrated General Education Science Curriculum Project

PI: Patricia Schmidt
Palomar College
1140 West Mission
San Marcos, CA 92069-1415

Instrumentation & Laboratory Improvement
DUE-9651115
FY 1996 $77,449
Oceanography

Mathematics Multimedia Presentation Classroom

PI: Kevin McDonald
Mount San Antonio College
1100 North Grand
Walnut, CA 91789-1341
kmcdonal@ibm.mtsac.edu

Instrumentation & Laboratory Improvement
DUE-9651186
FY 1996 $60,000
Mathematics

Computer-Enhanced Instruction for Physiology Laboratories Using McIntosh Computers and MacLab Sensor/Transducer Signal Interfaces

PI: James Sumich
Grossmont-Cuyamaca Community College District
8800 Grossmont College Dr
El Cajon, CA 92020-1765

Instrumentation & Laboratory Improvement
DUE-9651337
FY 1996 $25,442
Life Sciences

Graphical and Qualitative Investigations In Multivariable Calculus, Linear Algebra, and Differential Equations

PI: David Arnold
College of the Redwoods
7351 Tompkins Hill Road
Eureka, CA 95501-9302
darnold@northcoast.com

Instrumentation & Laboratory Improvement
DUE-9651374
FY 1996 $35,898
Mathematics

Restructured Physics Learning Environment
PI: David Mills
College of the Redwoods
7351 Tompkins Hill Road
Eureka, CA 95501-9302

Instrumentation & Laboratory Improvement
DUE-9651375
FY 1996 $9,068
Physics

The Redwood Connection
PI: Martha Racine
College of the Redwoods
Eureka, CA 95501-9302
racine@mail.redwoods.cc.ca.us

Network Infrastructure
NCR-9613950
FY 1996 $19,976
Computer Science

Connections to the NSFNET for Chabot College and Las Positas College
PI: William Threlfall
Chabot College and Las Positas Community College District
Pleasanton, CA 94566
CoPI: Scott Hildreth: Chabot College

Network Infrastructure
NCR-9521286
FY 1996 $25,000
Computer Science

Making Good the Promise: A Regional Infrastructure Model for Science Education by Way of Electronic Field Trips - from Abyss to Andromeda
PI: Kam Matray Networking Infrastructure for Education
Monterey Penninsula Unified School District
Monterey, CA 93942-1031
kmatray@nps.navy.mil
CoPI: David Warren: Cabrillo College

REC-9554325
FY 1996 $500,105 ($999,543)
Interdisciplinary

COLORADO

Rocky Mountain Advanced Technology Education Center
PI: Don Goodwin
Colorado Community College & Occupational Educational System
1391 N Speer Blvd Suite 600
Denver, CO 80204-2554

Advanced Technological Education
DUE-9553706
FY 1996 $117,294 ($298,464)
Manufacturing

Advancing Scientific and Technological Education in American Indian Communities
PI: Keith James
Colorado State University
Department of Psychology
Fort Collins, CO 80523
kjames@lamar.colostate.edu

Advanced Technological Education
DUE-9602376
FY 1996 $75,000
Multidisciplinary

The Earth and Space Science Technological Education Project (ESSTEP)
PI: Edward Geary
Geological Society of America
Department of Educational Programs
Boulder, CO 80302
egeary@geosociety.org
CoPI: Dorothy Stout: Cypress College

Advanced Technological Education
DUE-9602408
FY 1996 $149,944 ($594,869)
Geographical Information System

A New Model for Introductory Biology at Two-Year and Community Colleges
PI: Rodger Bybee
Biological Sciences Curriculum Study
Pikes Peaks Research Park
Colorado Springs, CO 80903

Course & Curriculum Development
DUE-9455725
FY 1996 $335,000 ($1,120,000)
Life Sciences

CONNECTICUT

Reformed Mathematics Pedagogy and Laboratory/Technical Activities in Support of Aeronautics and Space Technical Education for Community and Technical College Students

PI: John Pazdar
Capital Community Technical College
401 Flatbush Avenue
Hartford, CT 06106-3757
PAZDAR@APOLLO.COMMNET.EDU

Advanced Technological Education
DUE-9602456
FY 1996 $259,914
Mathematics

DISTRICT OF COLUMBIA

Science Technology: Knowledge and Skills

PI: David Lavallee
American Chemical Society
1155 16th Street, NW
Washington, DC 20036

Advanced Technological Education
DUE-9454564
FY 1996 ($500,000)$1,500,000
Chemical Technology

Expanding the Network of Community Colleges in Advanced Science and Engineering Technology Education

PI: James Mahoney
American Association of Community Colleges
One Dupont Circle, NW, Suite 410
Washington, DC 20036
jmahoney@aacc.nche.edu

Advanced Technological Education
DUE-9552975
FY 1996 $35,800 ($273,120)
Multidisciplinary

Business Alliance for Advanced Technological Education

PI: Peter Joyce
National Alliance of Business
1201 New York Avenue NW
Washington, DC 20005-3917
info@nab.com

Advanced Technological Education
DUE-9602352
FY 1996 $199,986 ($399,972)
Multidisciplinary

FLORIDA

Acquisition of an Autoanalyzer for Environmental Research

PI: Michael Helmstetter
Brevard Community College
Cocoa, FL 32922-6503
helmstetter.m@a1.brevard.cc.fl.us

Instrumentation and Instrument Development
DBI-9512544
FY 1996 $33,057
Life Sciences

Biomedical Engineering Technology Program Development

PI: Sandra Sanders
Broward Community College
225 E Las Olas Boulevard
Fort Lauderdale, FL 33301-2208
a021136t@bcfreenet.seflin.lib.fl.us

Advanced Technological Education
DUE-9602383
FY 1996 $250,000
Biotechnology

Exploring Mathematics in the Real World

PI: Marcia Bain
Florida Community College at Jacksonville
Jacksonville, FL 32202-4030
mbain@fccj.cc.fl.us

Course & Curriculum Development
DUE-9554811
FY 1996 $50,023
Mathematics

Reforming Mathematics Curriculum Through Computerized Laboratories and Cooperative Learning
PI: Jacquelyn Wozniak
Brevard Community College
1519 Clearlake Road
Cocoa, FL 32922-6503
wozniaj@a1.brevard.cc.fl.us

Instrumentation & Laboratory Improvement
DUE-9650737
FY 1996 $70,000
Mathematics

Using the TI-92 to Enhance the Learning of Precalculus and Calculus
PI: Sharon Griggs
St Petersburg Junior College
Saint Petersburg, FL 33733-3489
griggss@email.spjc.cc.fl.us

Instrumentation & Laboratory Improvement
DUE-9650960
FY 1996 $31,388
Mathematics

FT-IR for Continued Development of a Community College Microscale Organic Laboratory
PI: Edwin O'Sullivan
Broward Community College
225 E Las Olas Boulevard
Fort Lauderdale, FL 33301-2208
eddieo@bcfreenet.seflin.lib.fl.us

Instrumentation & Laboratory Improvement
DUE-9651140
FY 1996 $9,738
Chemistry

EPWG: Learning Mathematics Through Transactional Writing.
PI: Suzanne Austin
Miami-Dade Community College
11011 S W 104 Street
Miami, FL 33176-3330
SAUSTIN@KENDALL.MDCC.EDU

EHR Activities for Women & Girls in SEM
HRD-9554188
FY 1996 $221,882 ($620,286)
Interdisciplinary

MP/WG: Valencia BRIDGES Program
PI: Frances Frierson
Valencia Community College
P O BOX 3028
Orlando, FL 32802-3028
hscorp@ixnetcom.com

EHR Activities for Women & Girls in SEM
HRD-9555734
FY 1996 $100,000
Interdisciplinary

Request for Connectivity to NSFNET
PI: Beatrice Fernandez
Valencia Community College
P O BOX 3028
Orlando, FL 32802-3028
fernanb@MAIL.FIRN.EDU

Network Infrastructure
NCR-9528812
FY 1996 $115,874
Computer Science

Addressing National Needs for Skilled Technical Degree Graduates
PI: Jeanne Dieisen
Indian River Community College
3209 Virginia Avenue
Fort Pierce, FL 34981-5541

Studies and Indicators Project
REC-9628036
FY 1996 $364,021 ($944,629)
Multidisciplinary

GEORGIA

Science and Mathematics are Right Together (SMART)
PI: John Morrell
Atlanta Metropolitan College
1630 Stewart Avenue S W
Atlanta, GA 30310-4448

Young Scholars Program
ESI-9553538
FY 1996 $52,336 ($104,672)
Chemistry

HAWAII

Center for Ultraviolet Radiation Research at the Hawaii Institute of Marine Biology
PI: Paul Jokiel
University of Hawaii Windward Community College
Kaneohe, HI 96744-3528
jokiel@hawaii.edu
Field Stations
DBI-9512641
FY 1996 $78,294
Life Sciences

Interactive Learning in Noisy and Changing Environments
PI: Anthony Kuh
University of Hawaii Honolulu Community College
874 Dillingham Boulevard
Honolulu, HI 96817-4505
Neuroengineering
ECS-9625557
FY 1996 $52,008 ($229,267)
Computer Science

West Hawaii Explorations Academy: A Center for Integrative Secondary Curriculum Development
PI: William Woerner
Hawaii Department of Education
PO Box 2360
Honolulu, HI 96804
Instructional Materials Development
ESI-9452790
FY 1996 $131,654 ($475,000)
Instructional Materials Development

ILLINOIS

Chicago Chemical Laboratory Technology Education Partnership
PI: Donald Soucek
City Colleges of Chicago Harry S Truman College
1145 Wilson Avenue
Chicago, IL 60640-5616
Advanced Technological Education
DUE-9602443
FY 1996 $139,918 ($210,081)
Chemical Technology

Creating Partnerships between Urban Community College and Industry to Prepare Students to Enter and Succeed in the Technical Workforce
PI: Nancy DeSombre
City Colleges of Chicago Harold Washington College
30 East Lake Street
Chicago, IL 60601-2420
Advanced Technological Education
DUE-9634670
FY 1996 $9,554
Multidisciplinary

A Team Approach to the Reform and Standardization of Core Courses in Science and Mathematics
PI: Constance Churchill
Oakton Community College
Des Plaines, IL 60016-1234
connie@oakton.edu
Institutional Reform
DUE-9652170
FY 1996 $199,920
Chemistry

Improvement to Three Undergraduate Chemistry Courses
PI: C. Jayne Wilcox
William Rainey Harper College
Algonquin & Roselle Roads
Palatine, IL 60067
Instrumentation & Laboratory Improvement
DUE-9650313
FY 1996 $13,798
Chemistry

Two-Year College Physics Workshop Project
PI: Curtis Hieggelke
Joliet Junior College
1215 Houbolt Avenue
Joliet, IL 60436-9002
curth@jjc.cc.il.us
Undergraduate Faculty Enhancement
DUE-9554683
FY 1996 $171,621 ($525,000)
Physics

Internet Access for Rural Colleges
PI: Wayne Henegar
Illinois Eastern Cmty College Wabash Valley College
2200 College Drive
Mount Carmel, IL 62863-2657
whenegar@midwest.com

Network Infrastructure
NCR-9613895
FY 1996 $80,000
Computer Science

INDIANA

Modeling FM Bat Sonar: An Approach Based on Neurophysiology, Artifical Neural Networks and Multi-Resolution Signal Analysis
PI: Mathew Palakal
Indiana University-Purdue University at Indianapolis
355 North Lansing
Indianapolis, IN 46202-2815
mpalakal@indyvax.iupui.edu
CoPI: Donald Wong: Indiana Vocational Technical College

Biotechnology
BES-9307650
FY 1996 $10,400 ($258,059)
Chemical Engineering

Advancing Geo-technology Education: Providing GIS/DPS/ Remote Sensing /Computer Cartography Skills for the Workforce of the Twenty-First Century
PI: William Dando
Indiana State University
Terre Haute, IN 47809-0001
gedando@scifac.indstate.edu
CoPI: Ronald Hutkin: Central Community College Platte Campus
CoPI: Norma Cottrell: Indiana Vocational Technical College Wabash

Advanced Technological Education
DUE-9553694
FY 1996 $6,250 ($300,000)
Geological Sciences

The Midwest Consortium for Advanced Technology Education
PI: Dennis Depew
Purdue University
Department of Technology
West Lafayette, IN 47907
ddepew@it.purdue.edu

Advanced Technological Education
DUE-9602355
FY 1996 $426,570 ($1,348,391)
Engineering Technology

A Physics Computing Laboratory With an Interactive Digitized Video Component
PI: Purna Das
Purdue University North Central Campus
US 421 & Indiana Tollroad
Westville, IN 46391
pdas@centaur.cc.purduenc.edu

Instrumentation & Laboratory Improvement
DUE-9650594
FY 1996 $23,330
Physics

Moveable Computer Workstations Designed to Facilitate the Use of STELLA II in the Biology Laboratory
PI: Victoria Henson-Apollonio
Purdue University North Central Campus
Westville, IN 46391
vhenson@centaur.cc.purduenc.edu

Instrumentation & Laboratory Improvement
DUE-9650838
FY 1996 $22,454
Life Sciences

IOWA

Advanced Technology Environmental Education Center (ATEEC)
PI: Ellen Kabat
Eastern Iowa Community College District
Davenport, IA 52803-2012
ekabat@eiccd.cc.ia.us

Advanced Technological Education
DUE-9454638
FY 1996 $999,998 ($2,999,866)
Environmental Technology

North Central Collaboration for Education in NDE/NDT
PI: David Holger
Iowa State University
213 Beardshear Hall
Ames, IA 50011
holger@iastate.edu

Advanced Technological Education
DUE-9602370
FY 1996 $224,208 ($673,705)
Engineering Technology

Internet Connection Project
PI: Greg Nichols
Marshalltown Community College
3700 South Center Street
Marshalltown, IA 50158-4760

Network Infrastructure
NCR-9629865
FY 1996 $26,136
Computer Science

KANSAS

Computers as Scientific Instruments in the General Chemistry Laboratory
PI: Howard Kivett
Fort Scott Community College
Fort Scott, KS 66701-3140
howardk@fsccax.ftscott.cc.ks.us

Instrumentation & Laboratory Improvement
DUE-9651163
FY 1996 $22,015
Chemistry

KENTUCKY

Portable Computer Algebra System Laboratories
PI: Anthony Newberry
University of Kentucky Research Foundation
Lexington, KY 40506-0057
anewbl@pop.uky.edu
CoPI: Darrell Abney: Maysville Community College
CoPI: Lillie Crowley: Lexington Community College

Instrumentation & Laboratory Improvement
DUE-9651142
FY 1996 $61,218
Mathematics

MAINE

Improving Physics Instruction for Technical Students Using a Microcomputer-Based Laboratory (MBL)
PI: Alfred Amatangelo
Central Maine Technical College
1250 Turner Street
Auburn, ME 04210-6436

Instrumentation & Laboratory Improvement
DUE-9651318
FY 1996 $15,852
Physics

MARYLAND

The Two-Year College in the Twenty-First Century: Breaking Down Barriers
PI: Mary Beth Monroe (Southwest Texas Jr College)
American Association of Physics Teachers
One Physics Ellipse
College Park, MD 20740-3842
mbm3@pinet.aip.org.

Advanced Technological Education
DUE-9450160
FY 1996 $358,975 ($1,185,405)
Physics

Physics Education in the Two-Year Colleges: A Neglected Resource
PI: Michael Neuschatz
American Institute of Physics
One Physics Ellipse
College Park, MD 20740-3842
stats@aip.org

Advanced Technological Education
DUE-9453180
FY 1996 $93,000 ($385,680)
Physics

NASA-CCITT Project in Remote Sensing, Image Processing, and Geographic Information Systems
PI: Patricia Cunniff
Prince George's Community College
301 Largo Road
Largo, MD 20772-2199
pc92@umail.umd.edu

Advanced Technological Education
DUE-9553662
FY 1996 $293,427 ($694,941)
Geographical Information System

Associate Degree for Manufacturing Technicians
PI: Arnold Packer
Johns Hopkins University
Baltimore, MD 21218
packer@jhunix.hcf.jhu.edu

Advanced Technological Education
DUE-9553664
FY 1996 $400,000 ($1,299,834)
Manufacturing

Enhancing Critical Thinking in General Chemistry Through Computer Investigations of Graphical Relationships
PI: Scott Sinex
Prince George's Community College
301 Largo Road
Largo, MD 20772-2199

Instrumentation & Laboratory Improvement
DUE-9650792
FY 1996 $29,519
Chemistry

Maryland Undergraduate Mathematics Enhancement Program II (MUMEP II)
PI: Jon Scott
Montgomery College Takoma Park
Takoma Park, MD 20912
jscott@umd5.umd.edu

Undergraduate Faculty Enhancement
DUE-9554632
FY 1996 $98,505
Mathematics

The Young Scholars Field Research Institute
PI: Janet McMillen
Prince George's Community College
301 Largo Road
Largo, MD 20772-2199

Young Scholars Program
ESI-9553500
FY 1996 $55,783 ($96,902)
Chemistry

CPMSA: "Comprehensive Partnerships for Minority Student Achievement (CPMSA) Project"
PI: Jerome Clark
Board of Education of Prince George's County
Upper Marlboro, MD 20772
CoPI: Patricia Cunniff: Prince Georges' Community College

Comprehensive Partnerships for Mathematics and Science Achievement
HRD-9624392
FY 1996 $1,171,577 ($3,486,341)
Interdisciplinary

RUI: Ty Insertional Mutagenesis in Yeast
PI: Molly Mastrangelo
Allegany Community College
Willow Brook Road
Cumberland MD 21502
mollym@ac.cc.md.us

Microbial Genetics
MCB-9643006
FY 1996 $4,550 ($114,904)
Life Sciences

MASSACHUSETTS

Fundamental Studies on the Nutrient Mist Bioreactor (NMB) with Non-lethal Product Release Methods Applied to Hairy Roots
PI: Pamela Weathers
Middlesex Community College
Springs Road
Bedford, MA 01730
weathers@wpi.wpi.edu

Biotechnology
BES-9414858
FY 1996 $114,141 ($251,833)
Chemical Engineering

REU-Site for Biotechnology
PI: Bruce Jackson
Massachusetts Bay Community College
50 Oakland Street
Wellesley, MA 02181-5359

Research Experiences For Undergraduate Sites
BIR-9424103
FY 1996 $60,296 ($116,092)
Life Sciences

Advanced Biotechnology Education Project
PI: Barry Werner
Middlesex Community College
Bedford, MA 01730
wernerb@admin.mcc.mass.edu

Advanced Technological Education
DUE-9454642
FY 1996 $392,109 ($1,132,394)
Biotechnology

Project ComTech: A Curriculum in Technology and Science
PI: Philip Sadler
Harvard College Observatory
60 Garden Street
Cambridge, MA 02138
psadler@cfa.harvard.edu

Advanced Technological Education
DUE-9602404
FY 1996 $373,927
Multidisciplinary

The Telecommunications and Networking Engineering Technology Education Project
PI: Gary Mullett
Springfield Technical Community College
Springfield, MA 01105
mullett@stccihub.stcc.mass

Advanced Technological Education
DUE-9602433
FY 1996 $200,000 ($400,000)
Telecommunication

Digital Video Computer Editing Laboratory
PI: Kirk Smallman
Springfield Technical Community College
Springfield, MA 01105

Instrumentation & Laboratory Improvement
DUE-9650693
FY 1996 $13,539
Engineering Technology

Laser Materials Processing Laboratory
PI: Peter Vangel
Springfield Technical Community College
Springfield, MA 01105
Vangel@stcciphub.stcc.edu

Instrumentation & Laboratory Improvement
DUE-9650745
FY 1996 $72,750
Engineering Technology

Computer Based Anatomy and Physiology: Improving Student Success
PI: Charles Weitze
Mount Wachusett Community College
444 Green Street
Gardner, MA 01440-1337

Instrumentation & Laboratory Improvement
DUE-9650796
FY 1996 $43,000
Life Sciences

Improving Science Education through GIS/GPS Technology
PI: Gary Beluzo
Holyoke Community College
303 Homestead Avenue
Holyoke, MA 01040-1091
gbeluzo@hcc.mass.edu

Instrumentation & Laboratory Improvement
DUE-9651211
FY 1996 $30,000
Interdisciplinary

Using Technology to Enrich and Expand the Horizons of Massasoit Community College Students
PI: Richard Butterworth
Massasoit Community College
Brockton, MA 02402-3900
rbutterworth@mecn.mass.edu

Instrumentation & Laboratory Improvement
DUE-9651399
FY 1996 $11,281
Mathematics

Undergraduate Fiber Optics and Communications for Engineering Technology
PI: James O'Brien
Bunker Hill Community College
Boston, MA 02129
jobrien@mecm.mass.edu

Undergraduate Faculty Enhancement
DUE-9554725
FY 1996 $52,850
Engineering

Math/Science Enhanced Manufacturing Technology Training for Females and Minorities
PI: James Amara
Middlesex Community College
Bedford, MA 02173
jima845519@aol.com

Teacher Enhancement Program
ESI-9453921
FY 1996 $170,370 ($356,076)
Engineering

MICHIGAN

Acquisition of a FTIR and Microscale Conversion in Chemistry Laboratories
PI: Bal Barot
Lake Michigan College
Benton Harbor, MI 49022-1881
barot@raptor.lmc.cc.mi.us

Instrumentation & Laboratory Improvement
DUE-9650725
FY 1996 $11,095
Chemistry

Connection of Kellogg Community College to MichNet and NSFNET
PI: Bruce Mills
Kellogg Community College
Battle Creek, MI 49017
millsb@mlc.lib.mi.us

Network Infrastructure
NCR-9625880
FY 1996 $23,076
Computer Science

MINNESOTA

A Cooperative Learning Environment that Fosters the Pursuit of Scientific Careers for American Indians
PI: Ted Wetherbee
Fond du Lac Community College
Cloquet, MN 55720
ted@mail.fdl.cc.mn.us

CISE Institutional Infrastructure
CDA-9417390
FY 1996 $232,025 ($897,016)
Computer Science

NetCo/CoNet Lab Proposal
PI: Michael Seymour
Minnesota Riverland Technical College
Austin, MN 55912
mseymour@rtc.tec.mn.us

Instrumentation & Laboratory Improvement
DUE-9651242
FY 1996 $58,000
Computer Science

Regional & Global Workshops in Community Computer Networking
PI: Mike Seymour
Minnesota Riverland Technical College
Austin, MN 55912
mseymour@rtc.tec.mn.us

Undergraduate Faculty Enhancement
DUE-9554693
FY 1996 $100,000
Computer Science

MISSISSIPPI

Improving Science and Engineering Technology Education at Community Colleges
PI: Rod Risley
Phi Theta Kappa Headquarters
460 Briarwood Drive Suite 415
Jackson, MS 39206
risleyra@phithetakappa.jackson.ms.us

Advanced Technological Education
DUE-9602459
FY 1996 $211,982
Multidisciplinary

Undergraduate Faculty Enhancement in Elementary Preservice Mathematics Education for 2-Year College
PI: Susan Ross
University of Southern Mississippi
Hattiesburg, MS 39403
sross@whale.st.usm.edu
CoPI: Wanda Dixon: Meridian Community College

Undergraduate Faculty Enhancement
DUE-9554663
FY96 $74,990
Mathematics

Transition to the Workplace Through Manufacturing Experiences
PI: Sandra Harpole
Mississippi State University
PO Box 6156
Mississippi State, MS 39762

Instructional Materials Development
ESI-9555646
FY 1996 $567,456 ($2,218,113)
Manufacturing

MISSOURI

Development of Theme-Based Biology Labs Using Computer-Assisted Lab Experiments and the Internet
PI: Mary Farmer
Heart of Ozarks Technical Community College
Springfield, MO 6581-5958
nfarmer@emhl.otc.cc.mo.us

Instrumentation and Laboratory Improvement
DUE-9650211
FY 1996 $35,000
Life Sciences

MONTANA

Environment and the Curriculum
PI: Patricia Hurley
Salish Kootenai College
Pablo, MT 59855-0117
phurley@skc.edu

Institutional Reform
DUE-9652157
FY 1996 $180,562
Life Sciences

NEVADA

A Partnership for Computer-Based Curriculum Development in Atmospheric Technology
PI: Melanie Wetzel
University of Nevada Desert Research Institute
Reno, NV 89506-0220
wetzel@sage.dri.edu
CoPI: Peter Jeschofnig: Colorado Mountain College
CoPI: Paul Biagi: Colorado Mountain College Alpine Campus

Advanced Technological Education
DUE-9602351
FY 1996 $150,000 ($450,000)
Atmospheric Sciences

Faculty Workshops for Implementing Reform of Business Calculus
PI: Jerry Johnson
University of Nevada
Reno, NV 89557
jjohnson@math.unr.edu
CoPI: William Newhall: Truckee Meadows Community College
CoPI: Gail Ferrell: Truckee Meadows Community College

Undergraduate Faculty Enhancement
DUE-9554709
FY 1996 $37,636
Mathematics

Nevada's Systemic Improvement Plan
PI: John Farley
University & Community College System
Box 451046
Las Vegas, NV 89154-1046
farley@nevada2.bitnet

Experimental Program to Stimulate Competitive Research
ESR-9353227
FY 1996 $1,485,000 ($6,055,000)
Interdisciplinary

NEW HAMPSHIRE

Defining the Emerging Role of the Technologist in a Computer-Aided-Engineering Environment
PI: Robert Simoneau
Keene State College
Keene, NH 03435-0001

Advanced Technological Education
DUE-9553767
FY 1996 $150,000 ($548,260)
Manufacturing

"Tri-State Physics": An Undergraduate Faculty Enhancement Program for Physics Instructors In Maine, New Hampshire, and Vermont"
PI: Doyle Davis
New Hampshire Technical College at Stratham
Concord, NH 03301
d_davis@tec.nh.us

Undergraduate Faculty Enhancement
DUE-9554744
FY 1996 $99,932
Physics

NEW JERSEY

Modular Approach to Biotechnology Laboratory Instruction Based on a Novel Green-Fluorescent Protein
PI: William Ward
Rutgers, The State University of New Jersey
Department of Biochemistry & Microbiology
New Brunswick, NJ 08903

Advanced Technological Education
DUE-9602356
FY 1996 $350,000
Biotechnology

Multimedia Communications Technology
PI: David Beyer
Middlesex County College
Edison, NJ 08818
dbeyer@pilot.njin.net

Advanced Technological Education
DUE-9602375
FY 1996 $309,983
Computer and Information Technology

Revitalization of Undergraduate Mathematics and Science: A Thematic Systems Approach
PI: Francis Spano
Middlesex County College
Edison, NJ 08818

Institutional Reform
DUE-9643650
FY 1996 $100,000 ($200,000)
Interdisciplinary

New Jersey Center for Advanced Technological Education
PI: Jack Waintraub
Middlesex County College
155 Mill Road
Edison, NJ 08818

Advanced Technological Education
ESI-9553749
FY 1996 $982,931 ($2,966,472)
Engineering Technology

NEW MEXICO

Project TIE: Training for Industry Education
PI: Mary Jane Willis
Albuquerque Technical Vocational Institute
Albuquerque, NM 87106-4023
mjwillis@tvi.cc.nm.us

Advanced Technological Education
DUE-9602349
FY 1996 $218,227 ($421,318)
Electronics

Development of User-Friendly Microcomputer-Based Instructional Aids for Introductory Courses in Electrical Engineering

PI: Howard Smolleck
New Mexico State University
Las Cruces, NM 88003-3699
hsmollec@nmsu.edu

Advanced Technological Education
DUE-9602430
FY 1996 $169,177
Engineering Technology

NEW YORK

Technology Instruction for the 21st Century

PI: Bernard Mohr
CUNY Queensborough Community College
56th Ave Springfield Blvd
New York, NY 11364
bemohr@delphi.com

Advanced Technological Education
DUE-9454613
FY 1996 $110,652 ($513,000)
Electronics

Technology Instruction for the 21st Century - Phase II

PI: Bernard Mohr
CUNY Queensborough Community College
New York, NY 11364
bemohr@delphi.com

Advanced Technological Education
DUE-9602369
FY 1996 $193,010 ($600,000)
Engineering Technology

LIGASE: Long Island Group About Science Education

PI: R. David Bynum
SUNY at Stony Brook
Department of Biochemistry
Stony Brook, NY 11794-0001
dbynum@life.bio.sunysb.edu

Advanced Technological Education
DUE-9602450
FY 1996 $225,000 ($450,000)
Biotechnology

Development of Course Materials to Promote Collaborative Learning through Interactive Animation for Mathematics

PI: David Sher
Nassau Community College
Garden City, NY 11530-4533
sherd@sunynassau.edu

Course & Curriculum Development
DUE-9554949
FY 1996 $81,346
Mathematics

Ultrafast Laser Laboratory for Photonics Undergraduates

PI: Dean Richardson
SUNY Institute of Technology Utica-Rome
Utica, NY 13502-4013

Instrumentation & Laboratory Improvement
DUE-9651324
FY 1996 $34,360
Engineering Technology

An Undergraduate Photonics Laboratory

PI: David Lieberman
CUNY Queensborough Community College
56th Ave Springfield Blvd
New York, NY 11364

Instrumentation & Laboratory Improvement
DUE-9650617
FY 1996 $41,780
Engineering Technology

SUNY Farmingdale CAD Laboratory Improvement to Include Rapid Prototyping

PI: Dimitrios Maltezos
SUNY College of Technology Farmingdale
Rt 110 & Melville Rd
Farmingdale, NY 11735
maltezdg@sunyfarva.bitnet

Instrumentation & Laboratory Improvement
DUE-9650653
FY 1996 $47,040
Engineering Technology

Mathematics Learning Laboratory
PI: Jorge Perez
CUNY Laguardia Community College
31 10 Thomson Avenue
Long Island City, NY 11101-3071
pzjlg@cunyvm.cuny.edu

Instrumentation & Laboratory Improvement
DUE-9650658
FY 1996 $70,000
Mathematics

Enhancing Undergraduate Analytical Lab Skills Using the Technique of Nuclear Magnetic Resonance
PI: Venkat Chebolu
Jefferson Community College
Outer Coffeen Street
Watertown, NY 13601
VENKAT CHEBOLU@CCMGATE.SUNYJEFFERSON.EDU

Instrumentation & Laboratory Improvement
DUE-9651061
FY 1996 $37,737
Chemistry

Computer Assisted Interdisciplinary Problem Solving in Mathematics and Science
PI: Carol Freeman
Community College Finger Lakes
Lincoln Hill Road
Canandaigua, NY 14424
freeman@sjfc.edu

Instrumentation & Laboratory Improvement
DUE-9651271
FY 1996 $31,830
Mathematics

Classroom Laboratories in Mathematics and Science
PI: Lawrence Sher
CUNY Borough of Manhattan Community College
199 Chambers Street
New York, NY 10007-1079

Instrumentation & Laboratory Improvement
DUE-9651423
FY 1996 $59,998
Mathematics

Sage Junior College of Albany Chemistry Laboratory Enhancement
PI: Daniel Lewicki
Russell Sage College Junior College of Albany
140 New Scotland Avenue
Albany, NY 12208-3425
lewicd@sage.edu

Instrumentation & Laboratory Improvement
DUE-9651446
FY 1996 $14,871
Chemistry

Animations, Portfolios and CD-ROM Technology in Science and Calculus
PI: Patricia Wilkinson
CUNY Borough of Manhattan Community College
199 Chambers Street
New York, NY 10007-1079

Undergraduate Faculty Enhancement
DUE-9554672
FY 1996 $100,000
Mathematics

Femtosecond Optical Interactions in Glasses
PI: Frank Wise
Cornell University - Endowed
Ithaca, NY 14853-2801
fwise@msc.cornell.edu
CoPI: Nicholas Borrelli

Lightwave Technology
ECS-9612255
FY 1996 $590,955
Electrical Engineering

Connections to the Internet (NSF 96-64)
PI: Ronald Cohn
Sullivan County Community College
Loch Sheldrake, NY 12759-4002
rjcohn@zelacom.com

Network Infrastructure
NCR-9613896
FY 1996 $20,000
Computer Science

NORTH CAROLINA

The Capstone Project: An Integrated Approach to Learning
PI: Benjamin White
Wake Technical Community College
Raleigh, NC 27603-5655
brwhite@wtcc-gw.wake.tech.nc.us

Institutional Reform
DUE-9652146
FY 1996 $199,949
Engineering Technology

Roanoke River Valley Consortium Teacher Enhancement Project (R2VCTEP)
PI: Harvey Jones, Jr.
Roanoke River Valley Consortium-Hertford Cnty School Brd Office
Winton, NC 27986
CoPI: Charles Slemenda: Nash Community College

Teacher Enhancement Program
ESI-9554607
FY 1996 $50,000
Physical Sciences

NORTH DAKOTA

High Plains Rural Systemic Initiative
PI: Gerald Monetee
Turtle Mountain Community College
Box 340
Belcourt, ND 58316-0340

Rural Systemic Initiative Program
ESR-9642720
FY 1996 $567,538 ($2,167,538)
Mathematics

OHIO

RUI: Competitive Co-Existence of Two Predators in a Spatially Patterned Landscape
PI: Ann Rypstra
Miami University Hamilton Campus
1601 Peck Boulevard
Hamilton, OH 45011-3316
rypstra@msmail.muohio.edu

Ecology
DEB-9527710
FY 1996 $200,000
Environmental Biology

Partnership for the Advancement of Chemical Technology (PACT)
PI: Arlyne Sarquis
Miami University Middletown
Middletown, OH 45042-3458
sarquiam@muohio.edu

Advanced Technological Education
DUE-9454518
FY 1996 $400,000 ($1,200,000)
Chemical Technology

National Center of Excellence for Advanced Manufacturing Education (NCE/AME)
PI: David Harrison
Sinclair Community College
444 West Third Street
Dayton, OH 45402-1421
DHARRIS0@SINCLAIR.EDU

Advanced Technological Education
DUE-9454571
FY 1996 $1,000,000 ($3,000,000)
Manufacturing

Toledo Technology Academy
PI: Lionel Sully
Edison Industrial Systems Center
1700 N Westwood Ave-Suite 2286
Toledo, OH 43607-1241
lionel.sully@eisc.org

Advanced Technological Education
DUE-9602431
FY 1996 $500,000 ($1,200,000)
Manufacturing

National Center for Advanced Technological Education in Chemical Technology
PI: Fritz Kryman
University of Cincinnati Main Campus
Cincinnati, OH 45221
kryman@mozart.cas.uc.edu

Advanced Technological Education
DUE-9602437
FY 1996 $340,129 ($1,098,276)
Chemical Technology

Technological Education for Advanced Manufacturing
PI: Frederick Schoenig
Cleveland State University
Cleveland OH 44115
fschoenig@csuohio.edu

Advanced Technological Education
DUE-9602457
FY 1996 $299,880 ($608,756)
Manufacturing

HVAC Research and Development Project
PI: George Sehi
Sinclair Community College
444 West Third Street
Dayton, OH 45402-1421
gsehi@sinclair.edu

Instrumentation & Laboratory Improvement
DUE-9544183
FY 1996 $18,727 ($72,045)
Materials Science and Engineering

Incorporation of Cell and Tissue Culture Techniques and Environmental Physiology into the Undergraduate Curriculum
PI: Wendy McCullen
Columbus State Community College
550 East Spring Street
Columbus, OH 43215-1722
wmccullen@couger.colstate.cc.oh.us

Instrumentation & Laboratory Improvement
DUE-9650526
FY 1996 $32,924
Life Sciences

Biotechnology Laboratory Instrumentation Improvement
PI: Martha Brosz
Cincinnati Technical College
3520 Central Parkway
Cincinnati, OH 45223-2612

Instrumentation & Laboratory Improvement
DUE-9650655
FY 1996 $60,000
Life Sciences

Environmental Applications of Supercritical Fluids via the Discovery Approach
PI: Robert Mauldin
Shawnee State University
Portsmouth, OH 45662-4347
rmauldin@shawnee.edu

Instrumentation & Laboratory Improvement
DUE-9650675
FY 1996 $36,785
Chemistry

Creation of Economic Science Laboratory to Teach Classroom Experiments at Multiple Sites
PI: R. David Mullin
Bowling Green State University Firelands Branch
Huron, OH 44839-9791
mullin@bgnet.bgsu.edu

Instrumentation & Laboratory Improvement
DUE-9651170
FY 1996 $30,000
Economics

Teaching Science With Toys: Cultivating Advancements in Physical Science (TOYS: CAPS)
PI: Arlyne Sarquis
Miami University Middletown
4200 East University Blvd
Middletown, OH 45042-3458
sarquiam@muohio.edu

Teacher Enhancement Program
ESI-9355523
FY 1996 $671,456 ($1,524,090)
Physics

Young Investigators Summer Institute on Science and Agriculture
PI: Clyde Opliger
Ohio State University Agricultural Technical Institute
Wooster, OH 44691

Young Scholars Program
ESI-9552897
FY 1996 $95,989 ($166,978)
Chemistry

Connection to NSFNET
PI: Lu-Hsin Klein
Stark Technical College
6200 Frank Avenue N W
Canton, OH 44720-7228
ext. 235

Network Infrastructure
NCR-9641469
FY 1996 $6,669 ($19,680)
Computer Science

OKLAHOMA

An Innovative Approach for Advanced Technological Learning in Distinctive Manufacturing
PI: Rick Allison
Oklahoma State University Okmulgee
1801 East 4th Street
Okmulgee, OK 74447
rick@galstar.com

Advanced Technological Education
DUE-9602390
FY 1996 $300,000 ($600,000)
Manufacturing

Improving Undergraduate Instruction Through the Inauguration of a Multi-Disciplinary Computer Simulation Laboratory
PI: Gerhard Laule
Seminole State College
P.O. Box 351
Seminole, OK 74818-0351

Instrumentation & Laboratory Improvement
DUE-9650726
FY 1996 $55,000
Interdisciplinary

Teaching Microcomputer-Based Laboratory Physics Courses to Remote Sites Using Two-Way Video and Audio
PI: Brian Box
Northern Oklahoma College
1220 E Grand Ave
Tonkawa, OK 74653-4022

Instrumentation & Laboratory Improvement
DUE-9651020
FY 1996 $50,868
Physics

Developing Mobile and Industrial Electrohydraulic and Electropneumatic Technical Education
PI: Robert Vogt
Oklahoma State University Okmulgee
Okmulgee, OK 74447

Instrumentation & Laboratory Improvement
DUE-9651347
FY 1996 $71,454
Engineering Technology

OREGON

Northwest Center for Sustainable Resources (A National Center for Advanced Technology)
PI: Wynn Cudmore
Chemeketa Community College
4000 Lancaster Dr, PO BOX 14007
Salem, OR 97309-7070

Advanced Technological Education
DUE-9553760
FY 1996 $999,553 ($2,998,443)
Environmental Technology

High Vacuum Systems Laboratory
PI: David Hata
Portland Community College
Portland OR 97219-7197
dhata@pcc.edu

Instrumentation & Laboratory Improvement
DUE-9650916
FY 1996 $50,384
Engineering Technology

Dual Site Chemistry Laboratory
PI: Carolina Handy
Portland Community College
Portland OR 97219-7197
chandy@zeus.cc.pcc.edu

Instrumentation & Laboratory Improvement
DUE-9650968
FY 1996 $17,323
Chemistry

Development of Curricular Tools for Quantitative Estimation in Physics
PI: Bruce Emerson
Central Oregon Community College
Bend, OR 97701-5933
bemerson@metolius.cocc.edu

Instrumentation & Laboratory Improvement
DUE-9651038
FY 1996 $19,872
Physics

Enhancing Thinking Skills Using Computers in Non-Majors Biology at a Community College
PI: Joseph Russin
Lane Community College
Eugene, OR 97405-0640
russinj@lanecc.edu

Instrumentation & Laboratory Improvement
DUE-9651059
FY 1996 $60,234
Life Sciences

PPD/SP: Using ASTER to Improve Math and Science Accessibility by Students with Learning Disabilities
PI: Carolyn Gardner
Linn Benton Community College
6500 S W Pacific Blvd
Albany, OR 97321-3755

for Persons with Physical Disabilities
HRD-9554453
FY 1996 $49,557
Computer Science

PENNSYLVANIA

Chemical and Physical Properties of 2-Aminopyrroles
PI: Michael De Rosa
Pennsylvania State Univ Delaware County Campus
Media, PA 19063-5522
mxd19@psuvm.psu.edu

Bimolecular Processes
CHE-9420655
FY 1996 $41,600 ($105,500)
Chemistry

Culture, Science and Technology: A New Undergraduate Curriculum
PI: Addie Butler
Community College of Philadelphia
1700 Spring Garden
Philadelphia, PA 19130

Institutional Reform
DUE-9652153
FY 1996 $188,923
Engineering

Metamorphosing Organic Chemistry Laboratory into a Mini- Collaborative Work Place. Phase 1 - Enhancement of Learning by FT-IR Spectroscopy
PI: Girija Subramaniam
Pennsylvania State Univ Hazleton Campus
Hazleton, PA 18201
sxg11@psuvm.psu.edu

Instrumentation & Laboratory Improvement
DUE-9650991
FY 1996 $10,306
Chemistry

Integrating Computer-Enhanced Molecular Visualizaton into Organic Chemistry, General Chemistry, and Chemistry for Non-Majors
PI: Chris Maricondi
Pennsylvania State Univ McKeesport Campus
University Drive
McKeesport, PA 15132-7698
cxm13@psuvm.psu.edu

Instrumentation & Laboratory Improvement
DUE-9650993
FY 1996 $30,007
Chemistry

Interdisciplinary Automated Manufacturing Laboratory for the Electro-Mechanical Engineering Technology Program

PI: James Rehg
Pennsylvania State Univ Altoona Campus
Smith Building
Altoona, PA 16603
jar14@psu.edu

Instrumentation & Laboratory Improvement
DUE-9651001
FY 1996 $50,318
Engineering Technology

An Interdisciplinary Course in Quantitative and Scientific Literacy

PI: Cathy Godbois
Harrisburg Area Community College
Harrisburg, PA 17110
cagodboi@hacc01b.hacc.edu

Leadership in Laboratory Development
DUE-9651137
FY 1996 $86,950
Mathematics

CCP: Connection and Access to the Internet

PI: William Hunsberger
Community College of Philadelphia
Philadelphia, PA 19130

Network Infrastructure
NCR-9613899
FY 1996 $20,000
Computer Science

PUERTO RICO

Academic Research Infrastructure: Development of Automatic Test Station for Network Synchronization Performance Characterization

PI: Ricardo Mediavilla
American University of Puerto Rico
Bayamon, PR 00619
rmediavi@ns.inter.edu

CISE Institutional Infrastructure
CDA-9601692
FY 1996 $108,258
Computer Science

SOUTH CAROLINA

South Carolina Advanced Technological Education (SC ATE) Exemplary Faculty Project

PI: Lynn Mack
Piedmont Technical College
Department of Mathematics
Greenwood, SC 29646
mack@ped.tec.sc.us

Advanced Technological Education
DUE-9553740
FY 1996 $474,627 ($1,419,128)
Engineering Technology

South Carolina Advanced Technological Education (SC ATE) Center of Excellence

PI: Elaine Craft
South Carolina State Board Technical & Comprehensive Education
111 Executive Center Drive
Columbia, SC 29201
crafte@sbt.tec.sc.us
CoPI: Lynn Mack: Piedmont Technical College
CoPI: James Wood: Tri-County Technical College

Advanced Technological Education
DUE-9602440
FY 1996 $550,000 ($2,100,000)
Engineering Technology

Robotic Welding Technology

PI: Martha Vann
Trident Technical Colleges
Charleston, SC 29411
zpvann@triden.tec.sc.us

Instrumentation & Laboratory Improvement
DUE-9650053
FY 1996 $78,840
Engineering Technology

Enhancement of Undergraduate Chemistry Curriculum Through the Incorporation of FTIR
PI: Hal Wright
Trident Technical Colleges
Charleston, SC 29411
zpwright@trident.tec.sc.us

Instrumentation & Laboratory Improvement
DUE-9650828
FY 1996 $9,672
Chemistry

SOUTH DAKOTA

Woksape (Knowledge)
PI: Gregory Gagnon
Oglala Lakota College
P.O. Box 490
Kyle, SD 57752-0490

CISE Institutional Infrastructure
CDA-9643902
FY 1996 $2,261,629 ($4,611,629)
Computer Science

TENNESSEE

South East Advanced Technology Education Center for Communications Technology (SEATEC)
PI: Sydney Rogers
Nashville State Technical Institute
Nashville, TN 37209-4515

Advanced Technological Education
DUE-9602401
FY 1996 $219,622 ($449,594)
Telecommunication

Implementation of a Computer Networking Laboratory
PI: Matthew Mills
Northeast State Technical Community College
P O Box 246
Blountville, TN 37617-0246
mdmills@nstcc.cc.tn.us

Instrumentation & Laboratory Improvement
DUE-9650210
FY 1996 $55,000
Engineering Technology

Data Acquisition, Manipulation and Presentation in Physics and Physical Science
PI: Bryan Long
Columbia State Community College
P O Box 1315
Columbia, TN 38402-1315
longb@coscc.cc.tn.us

Instrumentation & Laboratory Improvement
DUE-9651477
FY 1996 $15,227
Physics

TEXAS

Southwest Center for Advanced Technological Education
PI: Robert Musgrove
Texas State Tech College Sweetwater
300 College Drive
Sweetwater, TX 79556-9803
RMusgrove@TSTC.EDU

Advanced Technological Education
DUE-9454643
FY 1996 $560,475 ($1,711,637)
Multidisciplinary

Advanced Technical Education (ATE) Alliance
PI: James Jordan
Consortium for Advanced Manufacturing International
1250 E. Copeland Road, Suite 500
Arlington, TX 76011
jim.jordan@ngmnet.org

Advanced Technological Education
DUE-9454655
FY 1996 $497,850 ($1,495,500)
Manufacturing

Machine Tool Advanced Skills Technology Educational Resources (MASTER) Program

PI: John Pierson
Texas State Technical Institute, Waco Campus
3801 Campus Drive
Waco, TX 76705
dpier@tstc.edu

Advanced Technological Education
DUE-9553716
FY 1996 $500,000 ($1,550,000)
Manufacturing

Building on the Crossroads in Mathematics Standards: A Project to Develop Introductory Mathematics Curriculum Materials

PI: John Souders
Center For Occupational Research and Development
601 Lake Air Drive
Waco, TX 76710-5878
jsouders@cord.org

Advanced Technological Education
DUE-9602361
FY 1996 $107,817
Mathematics

Implementing the Standards for Introductory College Mathematics Before Calculus

PI: Marilyn Mays
Dallas County Community College Dist, North Lake College
5001 N Macarthur Blvd
Irving, TX 75038-3804
memays@dccd.edu

Course & Curriculum Development
DUE-9555059
FY 1996 $120,014
Mathematics

Panola College Interdisciplinary Technology Center

PI: William Edmonson
Panola College
1109 West Panola Street
Carthage, TX 75633-2341

Institutional Reform
DUE-9652088
FY 1996 $181,075
Engineering Technology

Panola College Physics Laboratory Improvement

PI: Norma Evers
Panola College
1109 West Panola Street
Carthage, TX 75633-2341
nevers@pinet.aip.org

Instrumentation & Laboratory Improvement
DUE-9650100
FY 1996 $19,226
Physics

Improved Undergraduate Analytical Chemistry Through Use of Atomic Absorption Spectrometry and UV Visible Spectroscopy

PI: Connie Hendrickson
Dallas County Community College Dist Brookhaven College
3939 Valley View
Farmers Branch, TX 75234

Instrumentation & Laboratory Improvement
DUE-9650948
FY 1996 $12,425
Chemistry

Applying Instrumental Analysis to a Computerized Process

PI: Gary Hicks
Brazosport College
500 College Drive
Lake Jackson, TX 77566-3136
chicks@brazosport.cc.tx.us

Instrumentation & Laboratory Improvement
DUE-9650996
FY 1996 $35,684
Chemistry

Computerization of the General Chemistry Laboratory Program

PI: Joanne Lin
Houston Community College
Houston, TX 77270-7849
liny@hccs.cc.tx.us

Instrumentation & Laboratory Improvement
DUE-9651219
FY 1996 $19,865
Chemistry

Two-Year College Physics Faculty Enhancement Program
PI: Robert Clark
Texas A&M University Main Campus
College Station, TX 77843
r-clark@tamu.edu
CoPI: Thomas O'Kuma: Joliet Junior College

Undergraduate Faculty Enhancement
DUE-9554671
FY 1996 $279,952
Physics

New Connection of Laredo Community College to Internet
PI: Alma Hernandez
Laredo Community College
West End Washington St
Laredo, TX 78040
alhlcc@icsi.net

Network Infrastructure
NCR-9613881
FY 1996 $19,720
Computer Science

UTAH

UVSC - Native American Community College Multi-Location Internet Connection Project
PI: Gregory Jackson
Utah Valley State College
Orem, UT 84058-5999
jacksogr@uvsc.edu

Network Infrastructure
NCR-9613949
FY 1996 $80,000
Computer Science

Utah Valley State College Network (UVNET) Wireless Internet Connections Project
PI: Gregory Jackson
Utah Valley State College
800 West 1200 South
Orem, UT 84058-5999
jacksogr@uvsc.edu

Network Infrastructure
NCR-9613955
FY 1996 $75,000
Computer Science

VIRGINIA

Faculty Enhancement and Curriculum Development Activities to Improve Advanced Technology Education - Phase II
PI: John Tice
Wytheville Community College
1000 East Main Street
Wytheville, VA 24382-3308

Advanced Technological Education
DUE-9602397
FY 1996 $136,820 ($299,694)
Manufacturing

The Bigger Picture: A Project-Based Course on Environmental Geophysics and Geochemistry
PI: Sarah Kruse
College of William and Mary
Williamsburg, VA 23185
sekrus@mail.wm.edu
CoPI: Steven Semken

Course & Curriculum Development
DUE-9554973
FY 1996 $75,908
Geological Sciences

WASHINGTON

Advanced Technology Curriculum: Meeting AEA Standards
PI: Andrew Woodson
North Seattle Community College
9600 College Way North
Seattle, WA 98103-3514
awood@seaccd.sccd.ctc.edu

Advanced Technological Education
DUE-9553726
FY 1996 $300,000 ($600,000)
Electronics

Northwest Center for Emerging Technologies: New Designs for Advanced Technological Education
PI: Neil Evans
Bellevue Community College
P. O. Box 92700
Bellevue, WA 98009-2037
dbrown@ctc.ctc.edu

Advanced Technological Education
DUE-9553727
FY 1996 $992,386 ($2,992,054)
Computer and Information Technology

Materials Aspects of Manufacturing Technology Institute
PI: Thomas Stoebe
University of Washington
PO Box 2120
Seattle, WA 98195
stoebe@u.washington.edu
CoPI: John Rusin: Edmonds Community College

Advanced Technological Education
DUE-9602360
FY 1996 $218,154
Manufacturing

ChemCore: An Interdisciplinary Approach to Real-World Laboratory Chemistry
PI: Mary O'Brien
Edmonds Community College
Lynnwood, WA 98036-5912
mobrien@edcc.ctc.edu

Advanced Technological Education
DUE-9602403
FY 1996 $399,470
Chemical Technology

NSFNET: Green River Community College Connects to the World
PI: Vickie Booth
Green River Community College
Auburn, WA 98002-3622
vbooth@ctc.ctc.edu

Network Infrastructure
NCR-9522029
FY 1996 $20,349
Computer Science

WISCONSIN

Mathematical Sciences: "RUI: Magnetohydrostatic Problems Relevant to Current Sheets and Heating of the Solar Corona" Mathematics
PI: Edward Stredulinsky
University of Wisconsin Center Richland
Richland Center, WI 53581

Applied Mathematics
DMS-9622923
FY 1996 $67,500
Mathematics

An Advanced Biotechnology Education Partnership Program
PI: Joy McMillan
Madison Area Technical College
Madison, WI 53703-2285
jmcmillan@madison.tec.wi.us

Advanced Technological Education
DUE-9454555
FY 1996 $200,000 ($1,000,000)
Biotechnology

Blackhawk Technical College Physics Laboratory Project
PI: Debborah Smith
Blackhawk Technical Institute
P O BOX 5009
Janesville, WI 53547-5009

Instrumentation & Laboratory Improvement
DUE-9650354
FY 1996 $14,150
Physics

Quality Management in the Public Sector: The Next Paradigm
PI: Francois Sainfort
University of Wisconsin-Madison
750 University Ave
Madison, WI 53706-1490
francois@engr.wisc.edu
CoPI: Soren Bisgaard: Madision Area Technical College

Transformation to Quality Organizations
SBER-9529900
FY 1996 $98,230 ($196,320)
Engineering

APPENDIX II

MAP OF FY 1996 AWARDS TO TWO-YEAR COLLEGES BY STATE

This map includes the 197 awards listed in Appendix I plus IPAs (Missouri and New York), contracts (Illinois and Maryland) and summer interns (Arkansas and Mississippi) for a total of 203 awards.

APPENDIX III

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Morrell, John	ESI 9553538	54
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APPENDIX V

PUBLICATIONS OF PRIOR YEAR ACTIVITIES INVOLVING TWO-YEAR COLLEGES

Activities in Support of Two-Year College Science, Engineering, Technology, and Mathematics Education: Fiscal Year 1995 Highlights (NSF 96-83). This report gives the highlights of 1995 NSF support to two-year colleges through both leadership activities and leveraged program support. In particular, it highlights the growth in NSF support for two-year college activities from 1992 to 1995. Information on the 192 awards to two-year colleges is provided. Published in April of 1996.

Activities in Support of Two-Year College Science, Engineering, Technology, and Mathematics Education: Fiscal Year 1994 Highlights (NSF 95-74). This report gives the highlights of 1994 NSF support to two-year colleges through both leadership activities and leveraged program support. In particular, it highlights the growth in NSF support for two-year college activities from 1992 to 1994. Information on the 209 awards to two-year colleges is provided. Published in 1995.

Technical Education in 2-Year Colleges: HES 17. From 1993 to 1995, NSF's Division of Science Resource Studies (SRS) in cooperation with the Division of Undergraduate Education (DUE) and the Division of Research, Evaluation, and Communication (REC) conducted a survey on technical education in two-year institutions. This report provides data on aspects of engineering and science technology education in the nation's two-year colleges including numbers of two-year colleges involved in science and engineering technology; numbers of certificates and associate degrees awarded; enrollment and faculty in these programs; fields of study; linkages between technology programs and local businesses and industry including co-op, worker training and re-training, and school-to-work; linkages between technology programs and secondary schools including Tech-Prep; and transfer arrangements with four-year institutions. Published in March of 1995.

Partnering to Build a Quality Workforce: Critical Issues in Environmental Technology Education in Two-Year Colleges. In February of 1995 an NSF supported *Workshop on Critical Issues in Environmental Technician Education* was held in cooperation with the Advanced Technological Environmental Education Center (ATEEC). The following 5 critical issues were examined by the groups: (a) professionalization of environmental technician education as well as preparation, credentials, professional advancement, and continuing education of faculty; (b) curriculum and program development and implementation in environmental technician education; (c) environmental equity and human resources; (d) current and future employment needs; and (e) transferability of credits (2 + 2 + 2). The publication can be obtained from ATEEC, 500 Belmont Road, Bettendorf, Iowa 52722 or by phone at 319-344-0354.

Putting the Pieces Together: A Guide Book for Leaders of Coalitions of Two- and Four-Year Colleges and Universities. In October of 1993 the Division of Undergraduate Education sponsored a workshop on *Coalition Building for Effective Faculty Enhancement*. The goals of the workshop were to develop a

guidebook that could be used by individuals who are planning and leading coalitions, identify needs of community college faculty relative to faculty enhancement, generate increased interest from the scientific community in forming cooperative and collaborative projects, increase interest in interdisciplinary projects, and discuss evaluation and dissemination for coalition projects. The guidebook can be obtained by writing to Dr. Patricia Cunniff, Science and Technology Resource Center, Prince George's Community College, 301 Largo Road, Largo, Maryland 20772.

Advanced Technological Education: 1994 Awards and Activities (NSF 95-6). This publication includes information about the ATE program and FY 1994 awards, a brief history of the ATE program, a listing of awards by types of technology, abstracts of all awarded projects, an index of awards by state, an index of principal investigators, and numerous maps. Published in 1995.

Gaining the Competitive Edge: Critical Issues in Science and Engineering Technician Education (NSF 94-32). The workshop held July 21-23, 1993 in Washington, D. C. was in response to a nationally recognized need for a well-educated technical workforce in the high performance work place of advanced technologies to help the United States maintain a competitive edge in the world market. The purpose of the workshop was to identify critical issues in science and engineering technician education; develop recommendations for industry, academe, and government; and engage these communities into action. Deliberations focused on development of strategies to strengthen two-year college technician education programs; however, improving education programs for prospective technicians at the secondary school level and expanding opportunities for technicians at four-year colleges and universities and after employment were addressed as well. Published in 1994.

Activities in Support of Two-Year College Science, Engineering, Technology, and Mathematics Education: Fiscal Year 1993 Highlights (NSF 94-86). This report gives the highlights of NSF 1993 support to two-year colleges through both leadership activities and leveraged program support. Abstracts are included for awards made through the Division of Undergraduate Education. Published in 1994.

2nd Annual Conference on Diversity in the Scientific and Technological Workforce (NSF 94-12). This publications contains the report on a session organized around the topic of *Transition of Students From Two-Year to Four-Year Colleges*. This session dealt with the successful transition of minority students to four-year institutions. The objectives of the session were to develop strategies for achieving the broader goal of a significant increase by the year 2000 of minority students enrolled in SMET in two-year colleges that successfully transfer to four-year institutions. Published in 1994.

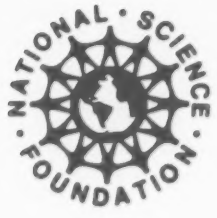
Building the System: Making Science Education Work (NSF 94-107) is a report of the 1994 NSF Invitational Conference. This conference included a session focused on *The New American Work Force: Scientific and Technical Development* and two exhibits which demonstrated innovative new approaches to technician education. Among the issues discussed in the session were education versus training; content base of basic science and mathematics; articulation and collaboration among institutions; avoidance of dead-end tracking; complexity of the diverse student population entering technical fields; and the role of "Tech-Prep" in attracting, motivating, and training future technicians. A briefing paper for the conference entitled *Technician Education: The Future of the U. S. Work Force* is included in the proceedings. Published in 1994.

Partners in Progress: Report of a National Science Foundation Workshop on the Role of Professional Societies in Two-Year College Science, Technology, Engineering, and Mathematics Education (NSF 93-64) This report contains recommendations from both interdisciplinary and disciplinary working groups for actions by professional societies to: (a) support the integrated teacher-scholar role of two-year

college SMET faculty, (b) encourage the formation of networks among SMET faculty, (c) promote membership and leadership by two-year college faculty, (d) enhance SMET education in two-year colleges, and (e) increase funding to two-year college SMET faculty. Published in 1993.

National Conference on Diversity in the Scientific and Technological Workforce (NSF 93-22) This report contains a copy of the plenary address made at the conference by Charles Merideth, President of New York Technical Institute, on the role of community and technical colleges in the education of minorities. He calls for these institutions to become leaders in this effort and to abandon the role of being ancillary to traditional four-year institutions. Published in 1993.

Matching Actions and Challenges: Report of a National Science Foundation Workshop on Science, Engineering, and Mathematics Education in Two-Year Colleges (NSF 91-111). The focus of this workshop was to reaffirm the important role two-year colleges play in science, mathematics, engineering, and technology (SMET) education. Recommendations are intended for two-year college faculty; professional societies; presidents and administrators; and state, local, and national funding agencies. Published in 1991.



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